# Conservation & Restoration
# of
# Sculptures and Antiques

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# Acknowledgement

The biggest gratitude I owe to my parents, for easing me into the profession and passing on the joy and dedication. Ronnie Gibbs my college chum at University helped me editing the manuscript which was really a great help. And but not least a huge thank you for the years of support of Benjamin and Jon.

(Singapore 26 August 2021)

# Introduction

This is a collection of treatments of archaeological historical and modern artefacts. This book is not meant as a recipe book, of how to deal with damaged artworks. The treatment of artefacts should be left to the professional, I encountered multiple cases where objects were cleaned and restored and it took hours or days to undo the procedure or the object was damaged.

Antique Indian bronze figure of Bhoga Shakthi, was acid cleaned and the patina mostly removed. The original patina is still visible in the recesses.

When compiling the images and texts, I had in mind to demonstrate the possibilities on how to preserve, conserve and restore artefacts in private and public collections. Keeping in mind, globally accepted museum-standards which can vary greatly from institution to institution. Wherever possible reversible techniques were applied and materials of the highest grades used to prevent premature deterioration of the substances applied. This means ultraviolet light and visible light, temperature and humidity should have little to no effect whenever possible and/or feasible. The treatments are generally keeping in mind the cost efficiency required by the owners. Not all artefacts were tested for authenticity since this is often not requested and involves considerable costs to hire the equipment and operator.

This compilation of projects was only possible due to the use of digital cameras at the turn of the millennia many projects I did before that are not recorded to this extent in colour and are usually part of museum records.

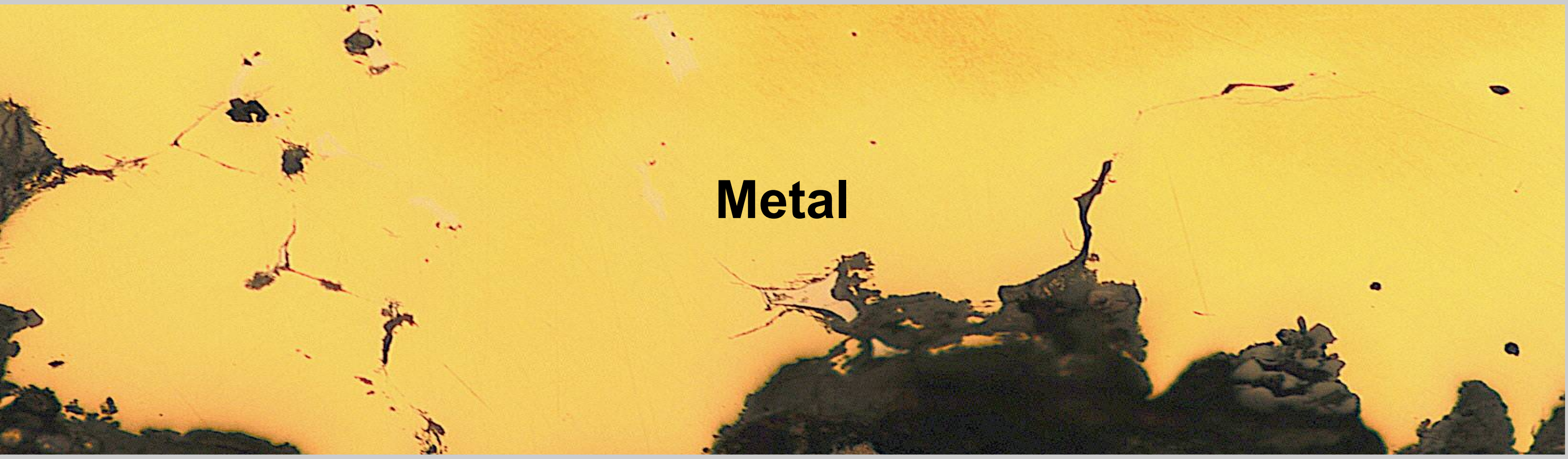
At this point I would also have to mention that some of the projects we're done in collaboration with students and assistants, with out their help it would have been very difficult to undertake the larger projects.

The projects especially the Roman and Greek and Egyptian artefacts were undertaken in the Royal Athena Gallery in Manhattan New York in 2000-2001 where I was Chief Conservator. This gallery has now ceased to exist (1954-2020). A couple projects are part of the Asian civilization museum collection in Singapore, these were treated between 2001-2003 in my capacity Senior Objects Conservator for the National Heritage Board. The bulk of the artefacts were conserved - restored in my various micro-studios in Singapore from 2003 to 2020.

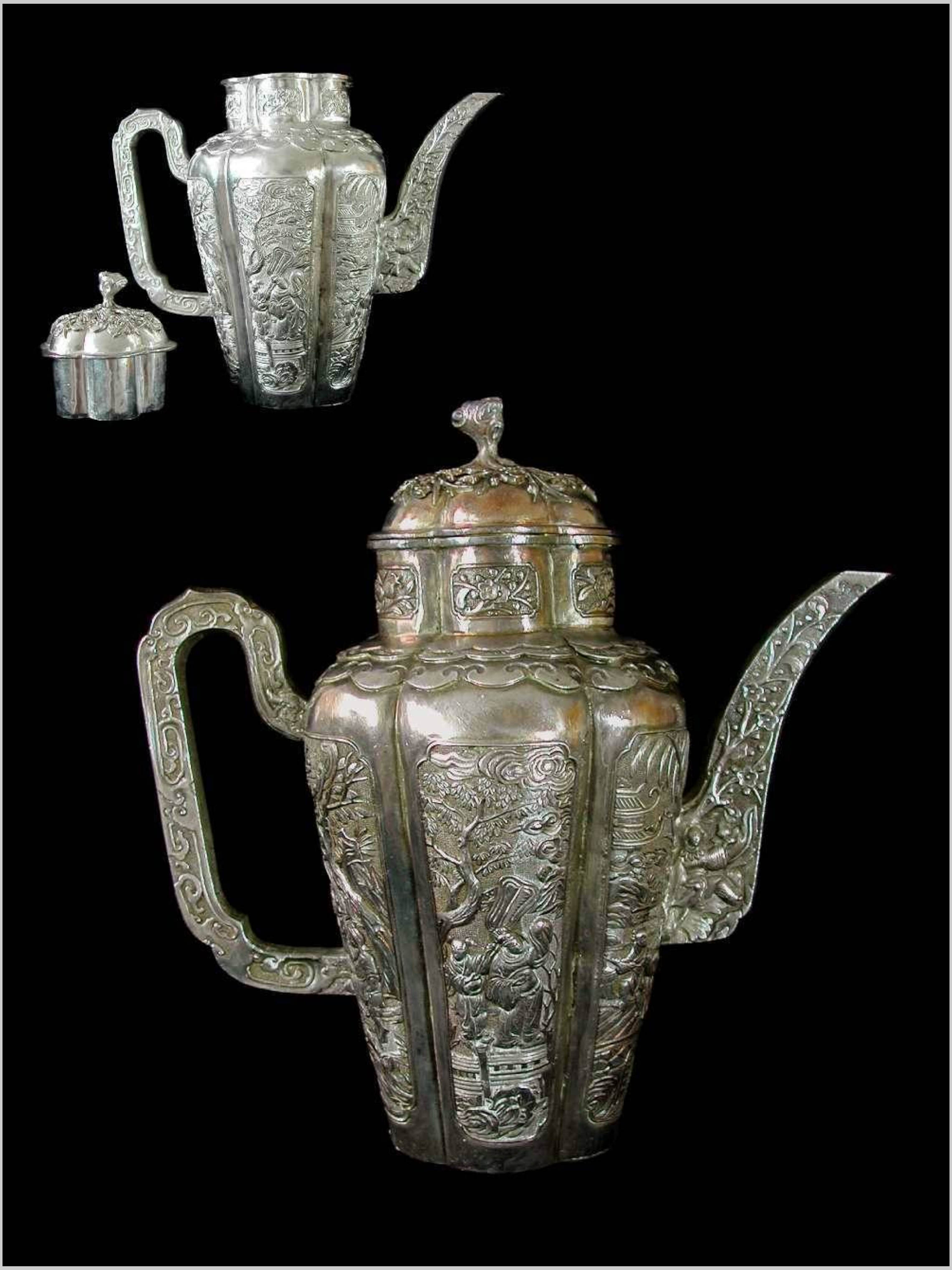
To do this kind of conservation – restoration work in a small studio setting can be a challenge. The health and safety, security and storage is of great concern. However, being based in Singapore has been a great help, since the accessibility to goods and services is facilitated by a well organised infrastructure and I it was possible to work for clients in Malaysia, Thailand and Indonesia.

I am very grateful to the private and institutional collections that gave me the possibility to work on such a wide array of materials. A conservator attached to an institutional collection generally has to abide by the philosophy dictated by the collection, I was able to mix and match ethics, technics and materials according to my vision for the artefact and its future, not always in tandem what institutionalised individuals would have chosen. The advantage of low risk preventive conservation with the ideology of a minimum invasive treatment approach, is not often feasible in a private collection, especially in a tropic, urban environment where the variables that can and will damage cultural heritage are much more invasive.

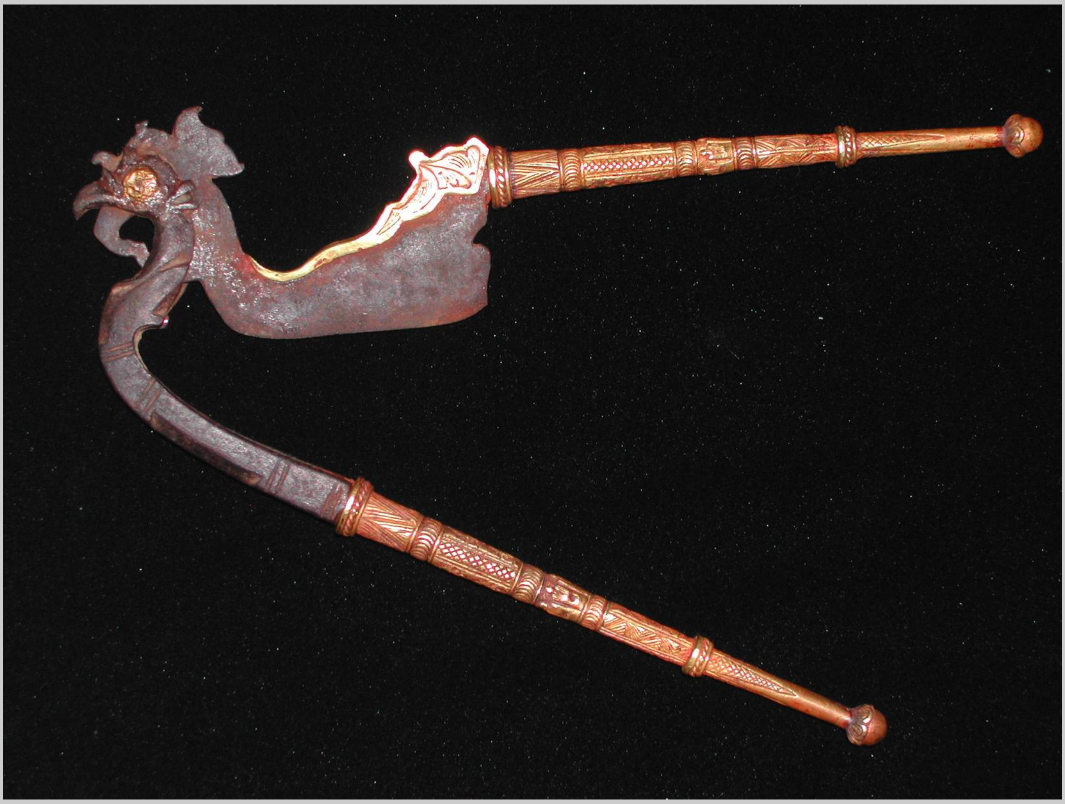
Singapore, Bangkok, Kuala Lumpur and Jakarta are all in an environmental zone that is very aggressive towards organic and inorganic materials and a museum environment is rarely possible in a private home. Metals will corrode with humidity and chlorides in the air. High light levels with deteriorate organic materials. Insects will be attacking organic artefacts and the high temperatures will exasperate the situation. So the treatment approach will seem excessive to a museum based conservator, however a museum approach in the conservation – restoration of many artefacts in tropical collections will inevitable fail which I learned the hard way in my early treatments. For example acrylics such as “Paraloid B72”, commonly advocated, applied and used frequently in global museums, will fail in a private collection not being monitored 24/7 to a museum level meaning 25° Celsius and 55% relative humidity. Over the past decades synthetic materials were heavily used in Asian sculptures, these composite objects of usually Polyester reinforced fibreglass and painted with solvent based car paints, react dramatic to the urban tropical climate. The high relative humidity of 80-90% and temperatures of 30-33° Celsius and excessive light exposure will cause these sculptures polyester matrix to crosslink and develop cracking. The paint used, adequate when constantly maintained in moderate climates start fading and oxidizing to a very unsightly extent.

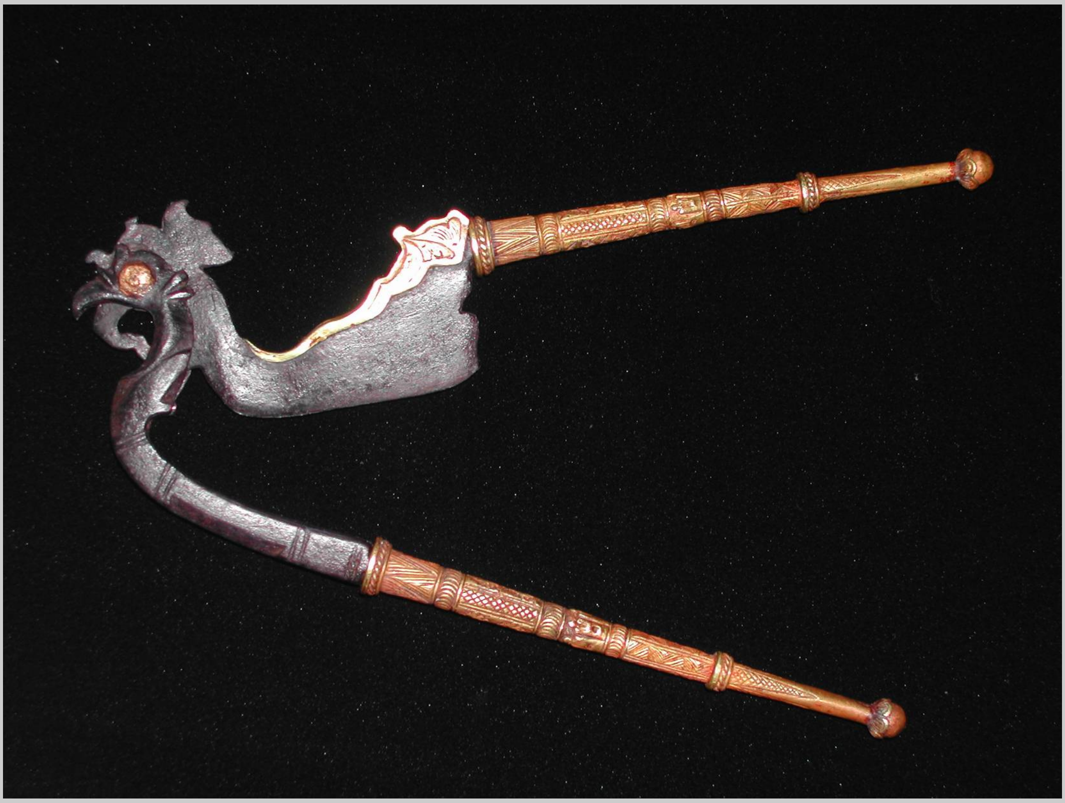


Metal

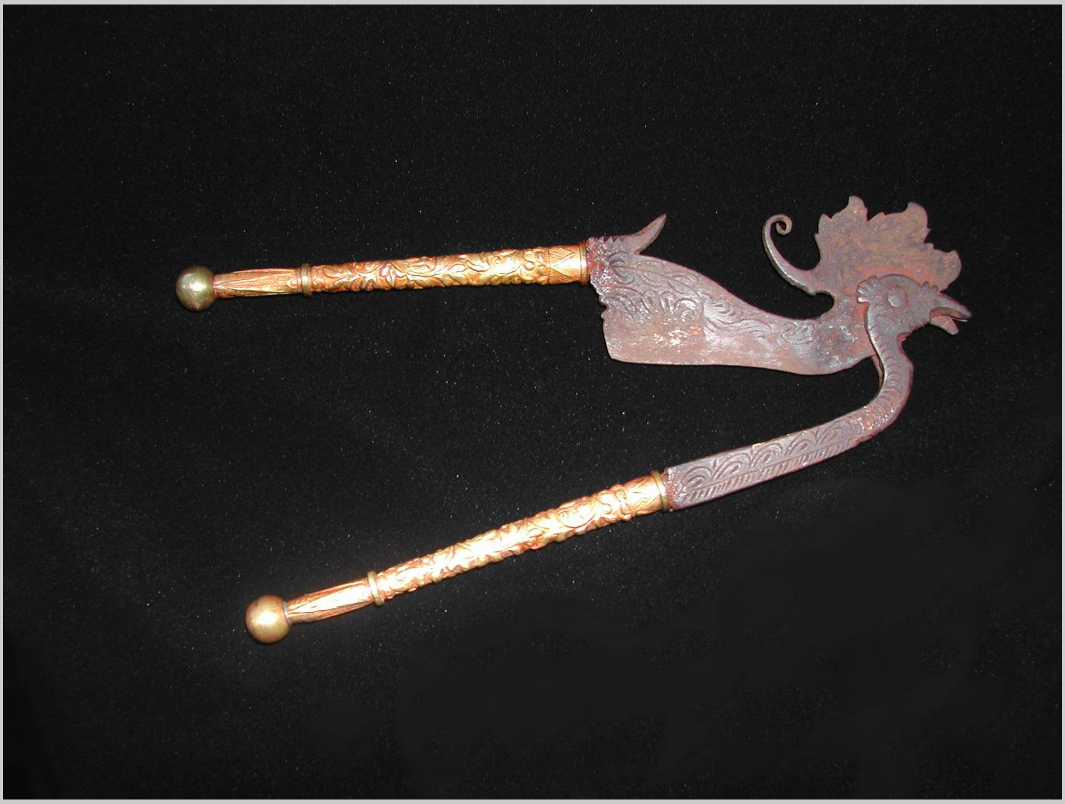


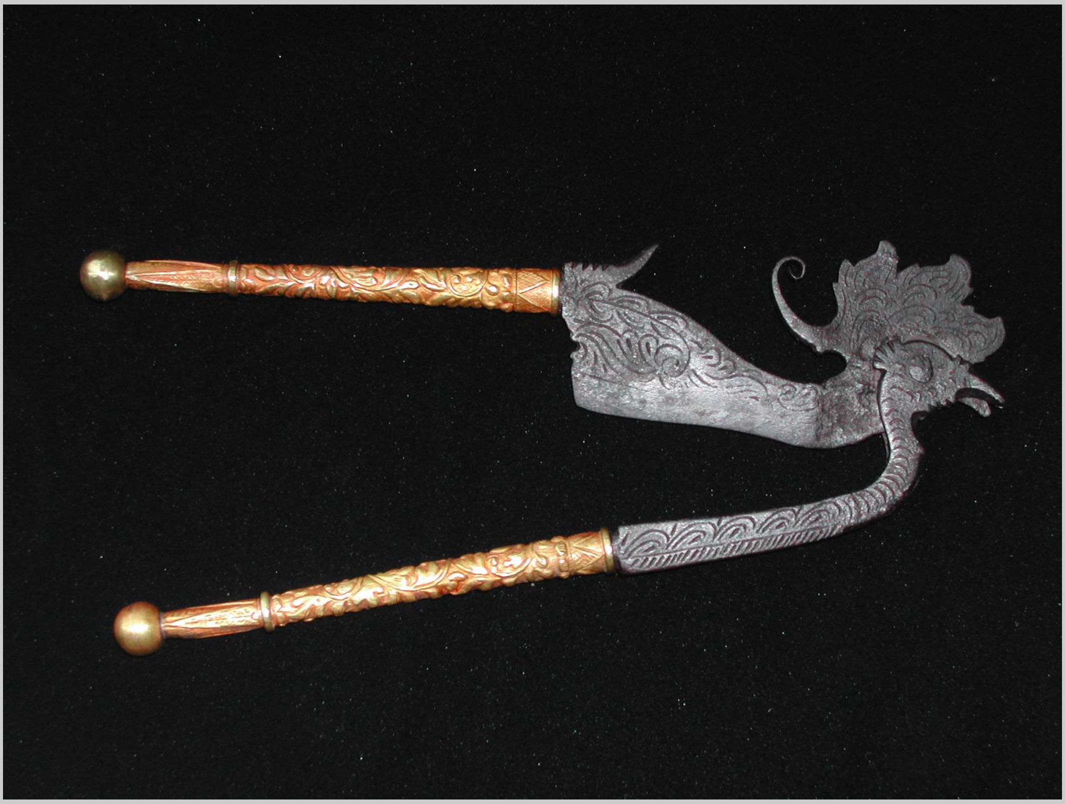
This export silver teapot was found crushed at a building sight in Hong Kong and was subsequently reshaped using high heat to make the silver malleable This process removed the original silver oxide corrosion. Highly diluted chemical solutions containing sulfur were applied to simulate the original silver sulphide corrosion and to restore the surface the antique appearance.



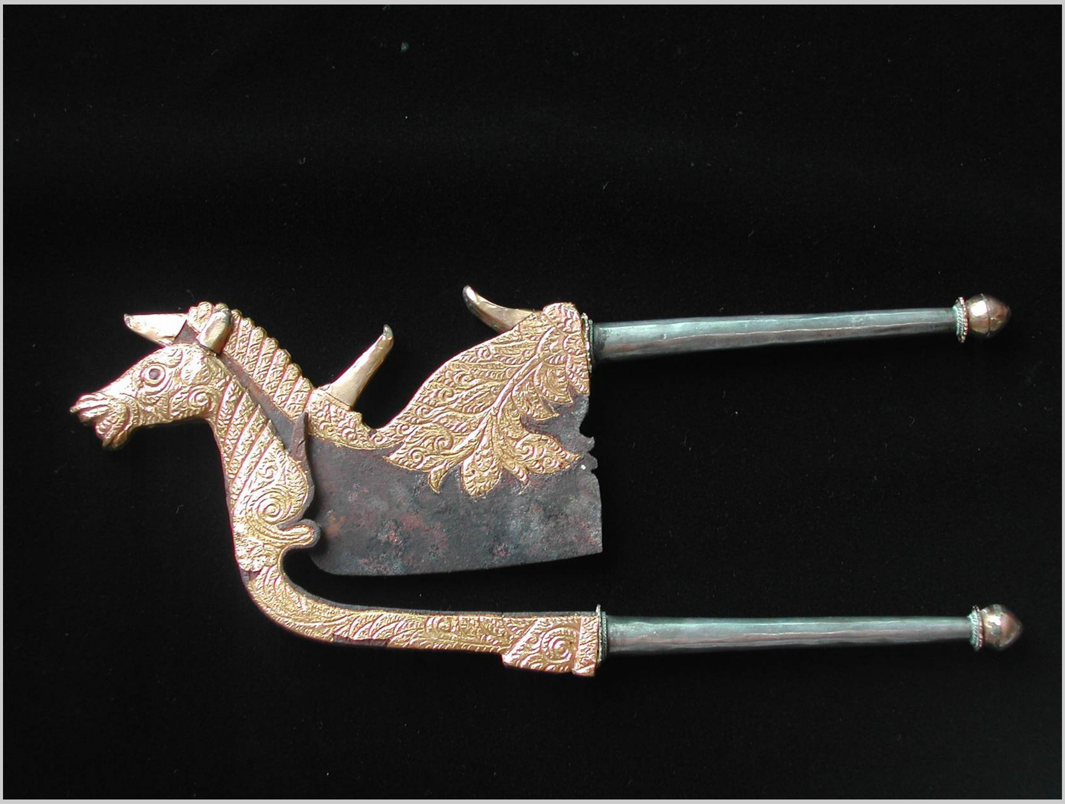


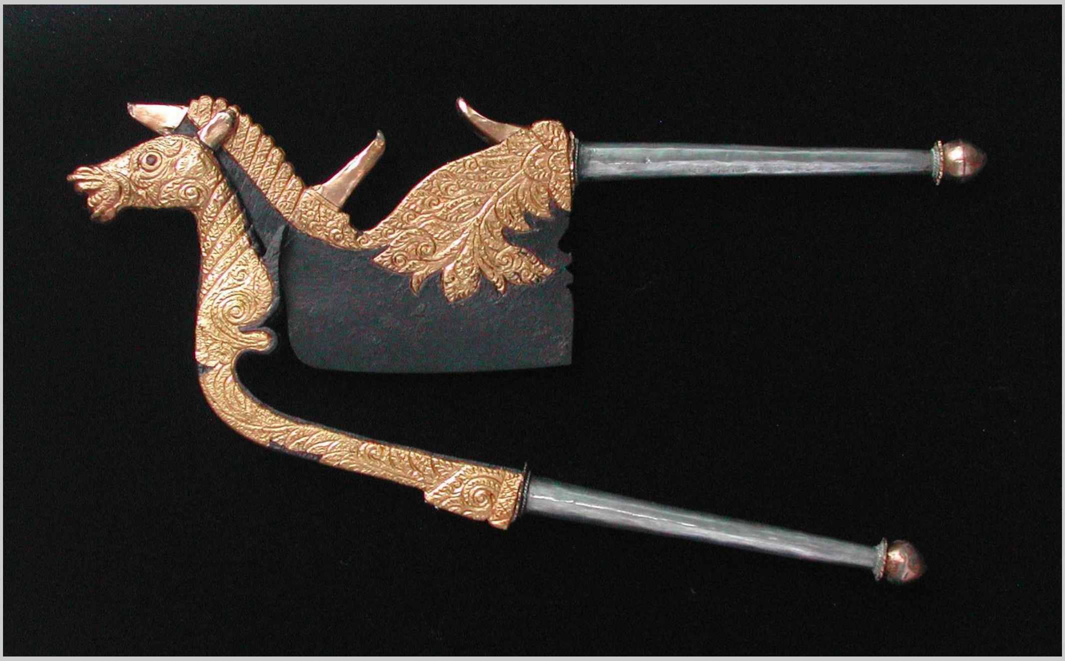
Peranakan Rooster Head Kacip (Betel Nut Cutter) late 19th early 20th century. Iron gilded. The iron was preferentially corroding and needed stabilisation. The flaking iron oxide was removed, treated with a corrosion inhibitor and coated with a protective lacquer to prevent further corrosion.



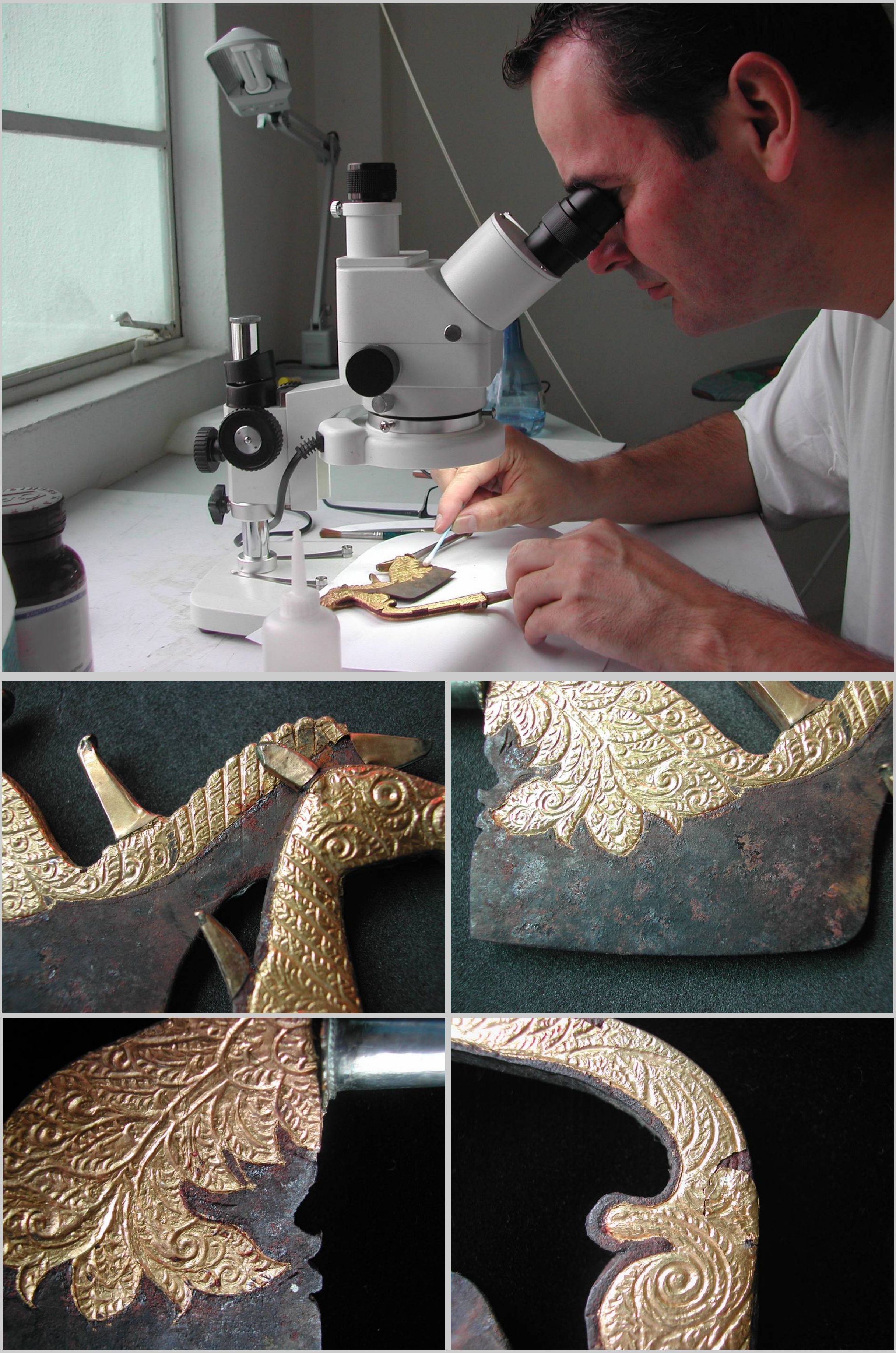


Peranakan Rooster Head Kacip (Betel Nut Cutter) late 19th early 20th century. Iron gilded. The iron was preferentially corroding and needed stabilisation. The flaking iron oxide was removed, treated with a corrosion inhibitor and coated with a protective lacquer to prevent further corrosion.

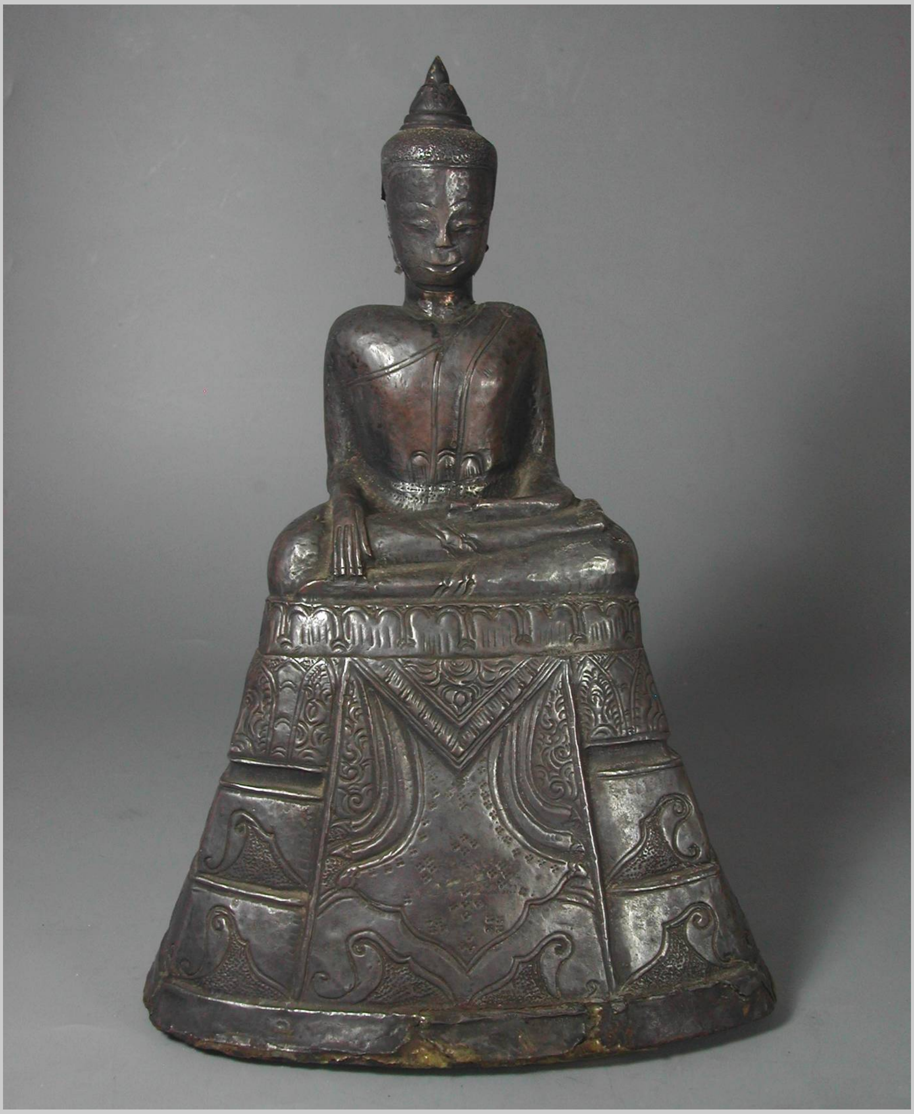


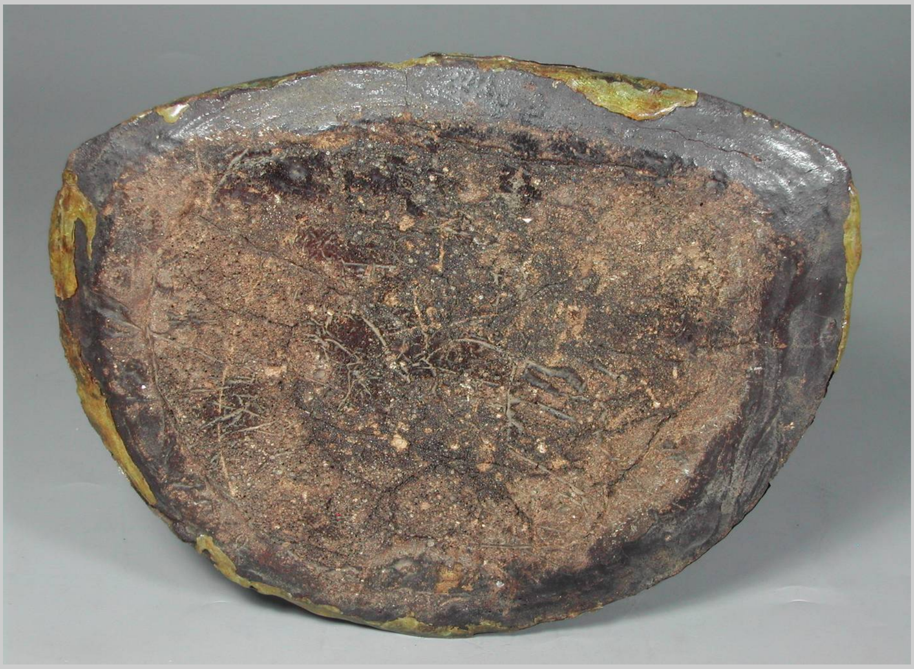


Peranakan Horse Head Kacip (Betel Nut Cutter) late 19th early 20th century. Iron gilded. The iron was preferentially corroding and needed stabilisation. The flaking iron oxide was removed, treated with a corrosion inhibitor and coated with a protective lacquer to prevent further corrosion. The silver covered handles were not polished.

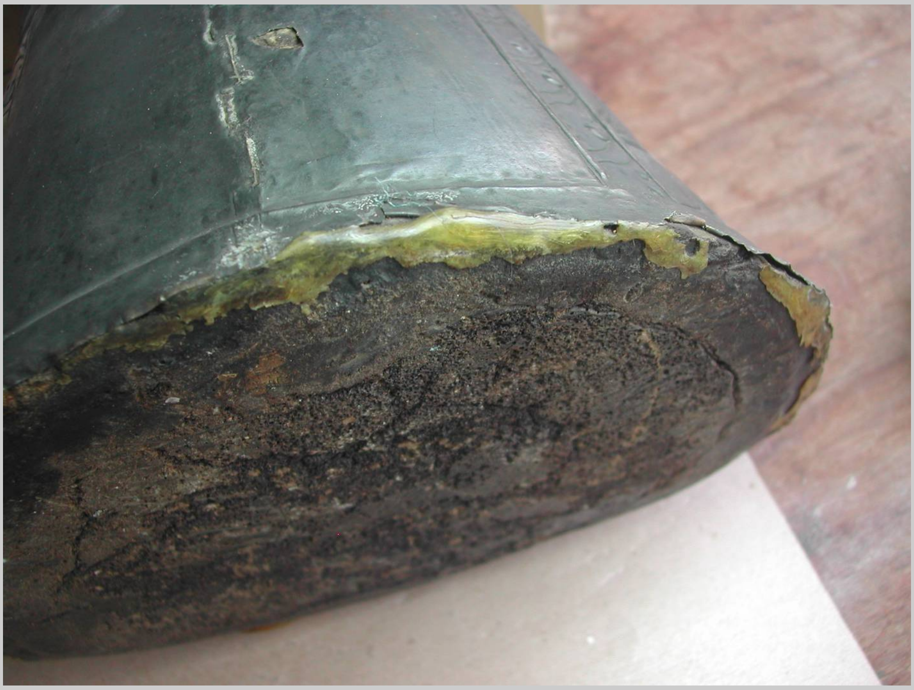


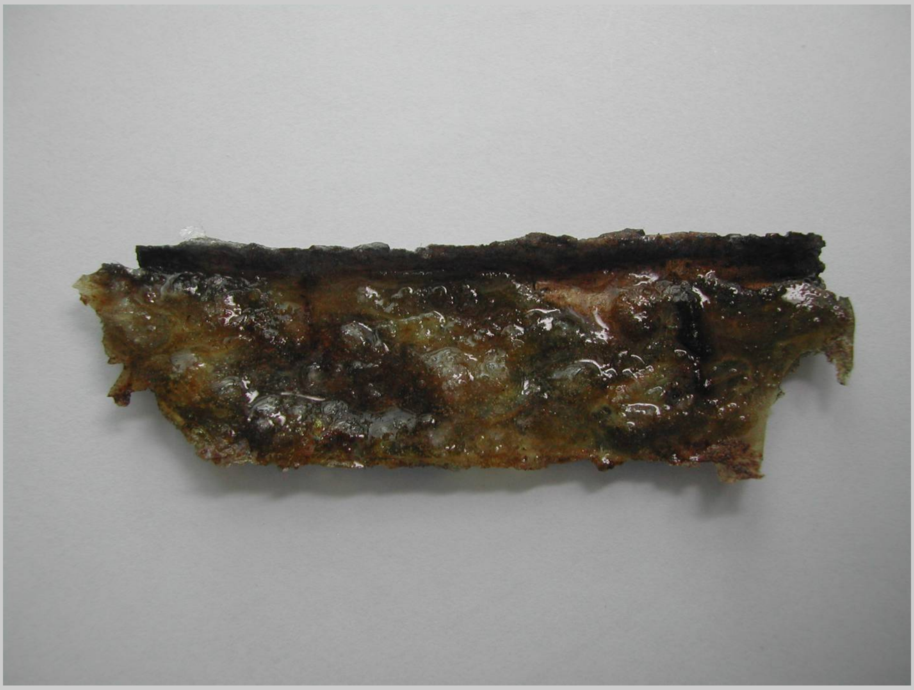
Removal of the lose iron oxide and the consolidation of the laminating gilding with a solvent soluble polymer, using a binocular microscope.



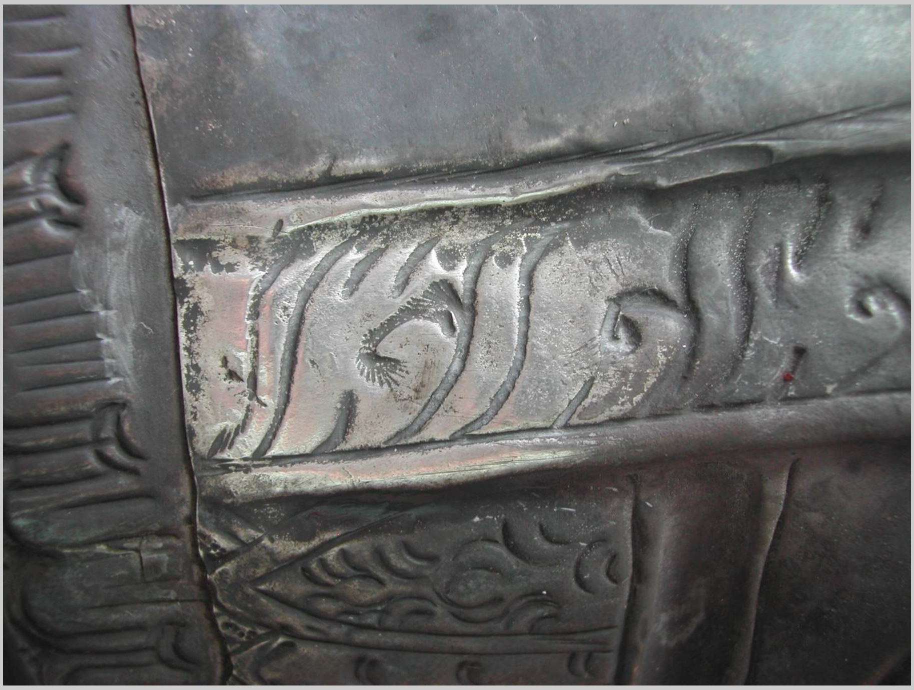


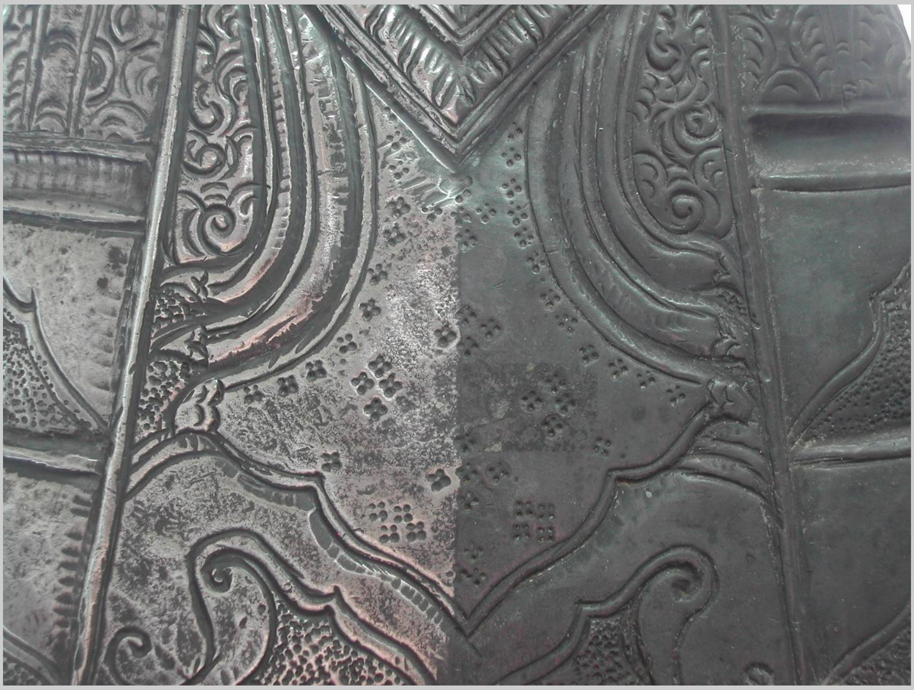
Silver sheet seated Buddha Cambodia, late 19th early 20th century, on an organic resin core. The figure has been previously restored, the modern polymer adhesive is deteriorated and brittle and silver is tarnished with a silver oxide surface.



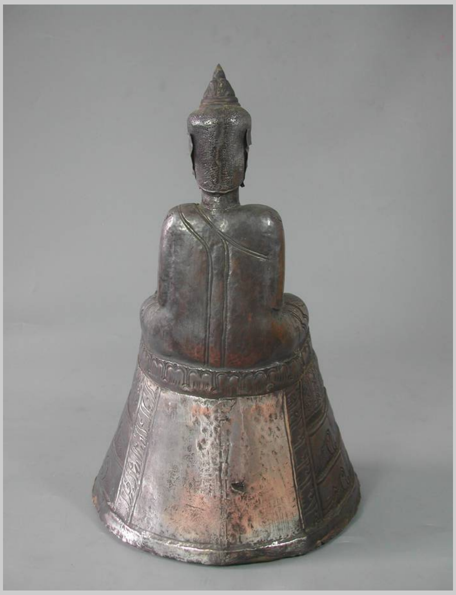


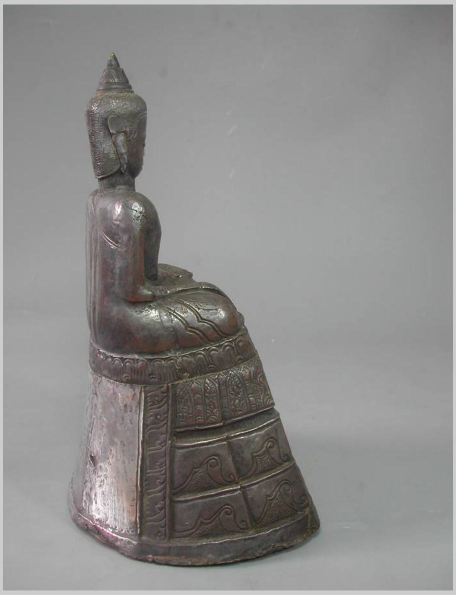
The old restoration was removed as much as possible with out further damaging the original silver sheet and organic resin core. The old synthetic resin was removed using a mixture of solvents in a carrier poultice. The silver sheet fragments were cleaned and reattached with a high molecular weight acrylic resin.



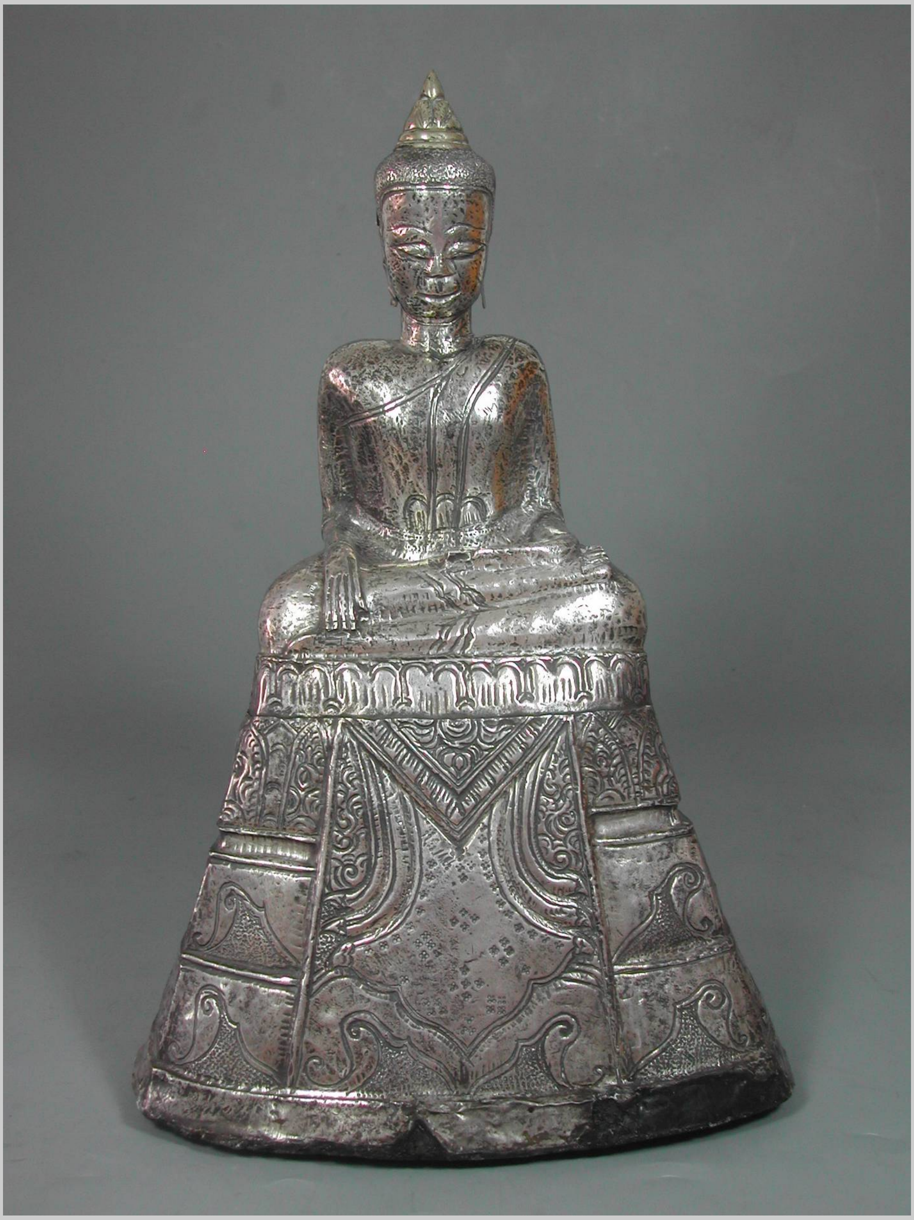


Small test patches were undertaken to test the hardness of the silver and the abrasive action of the polishing paste. It was decided on to use aluminium oxide abrasive in a natural aqueous lubricant. Under 20x magnification no scratching could be observed. Therefore it was decided to clean the lower back of the seated Buddha.

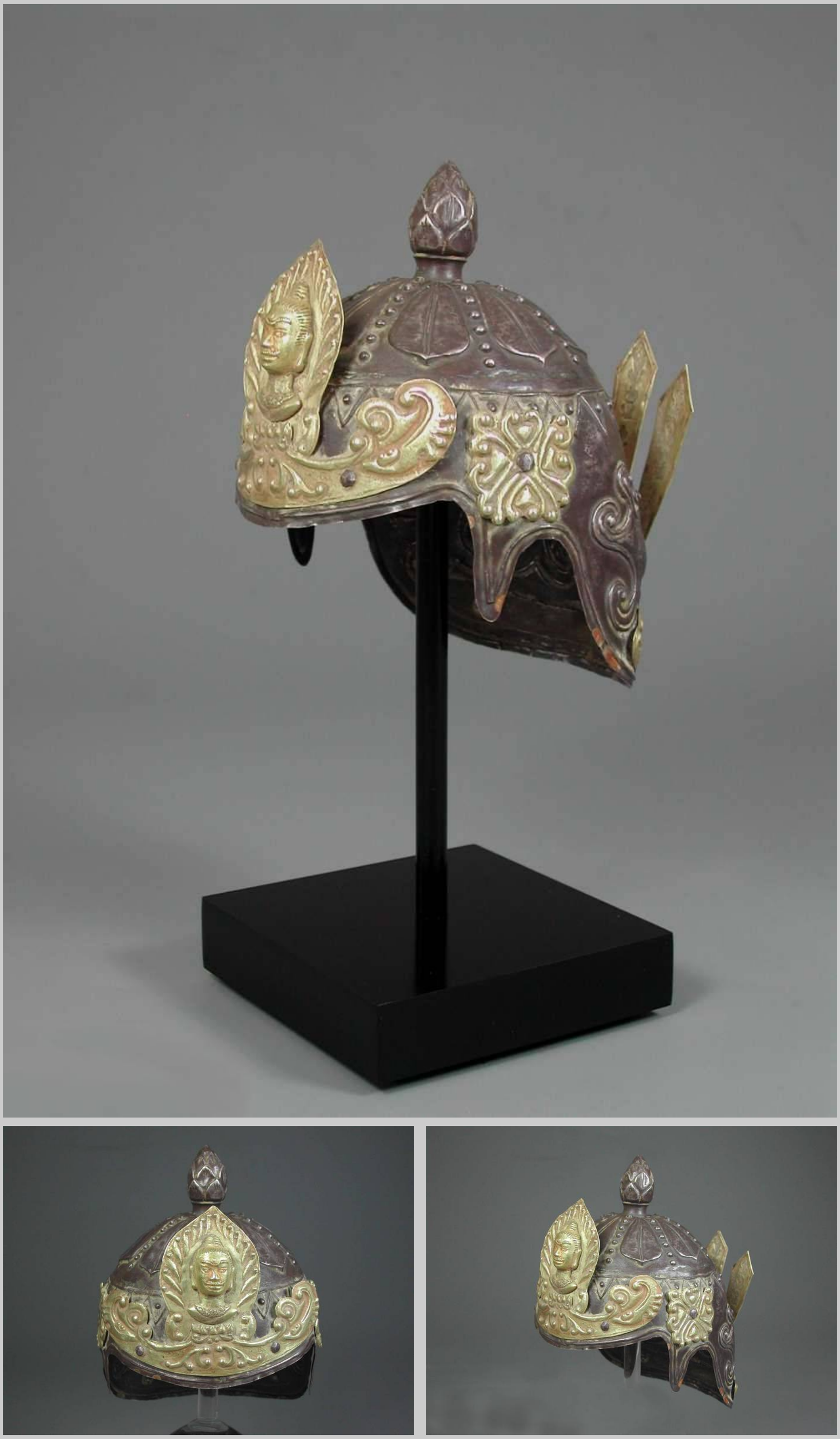




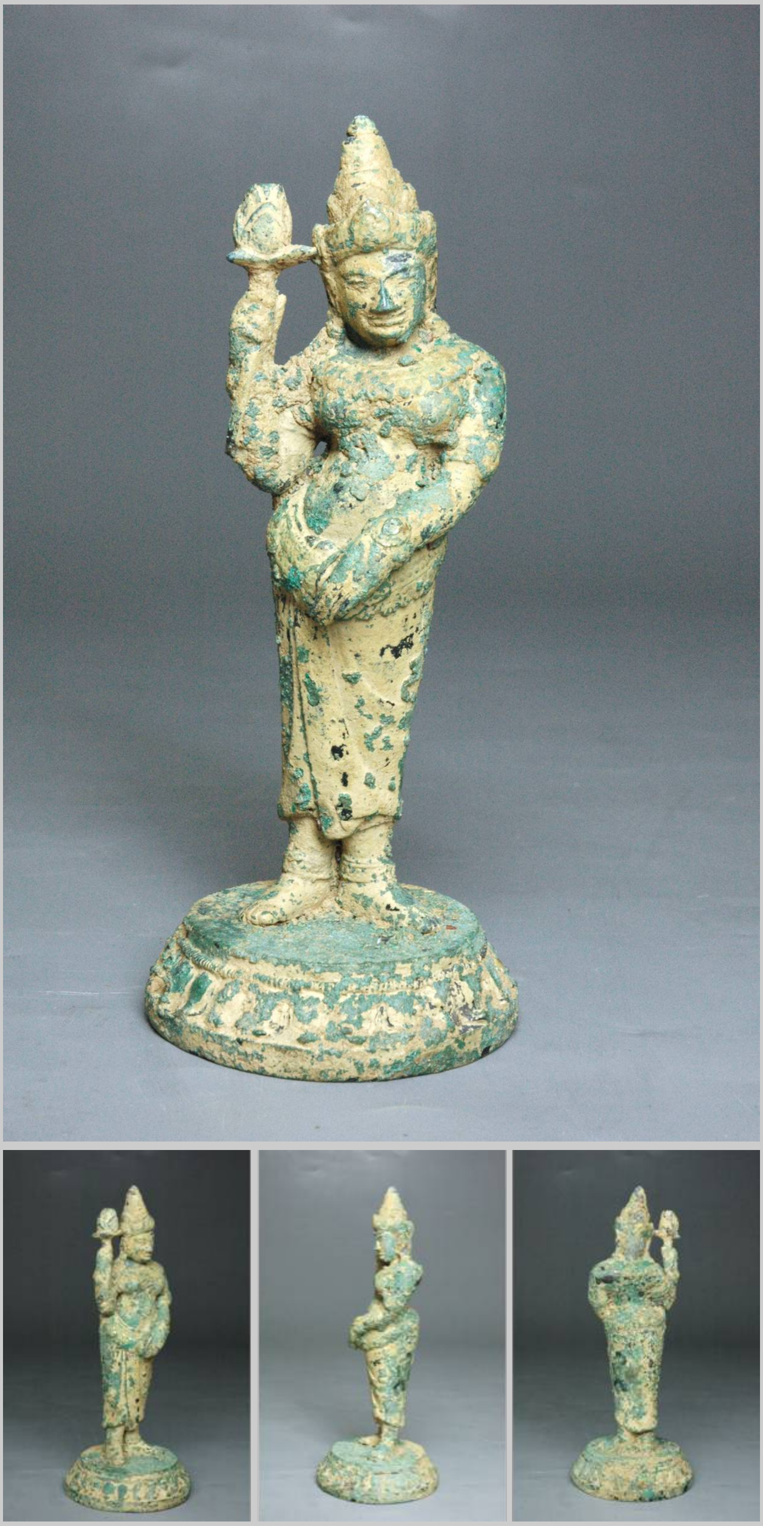
The polishing and removal of the disfiguring black silver oxide, was undertaken from the bottom back to the top front, this way any adverse effects could be stoped and prevented the disfiguration of the more visual parts.



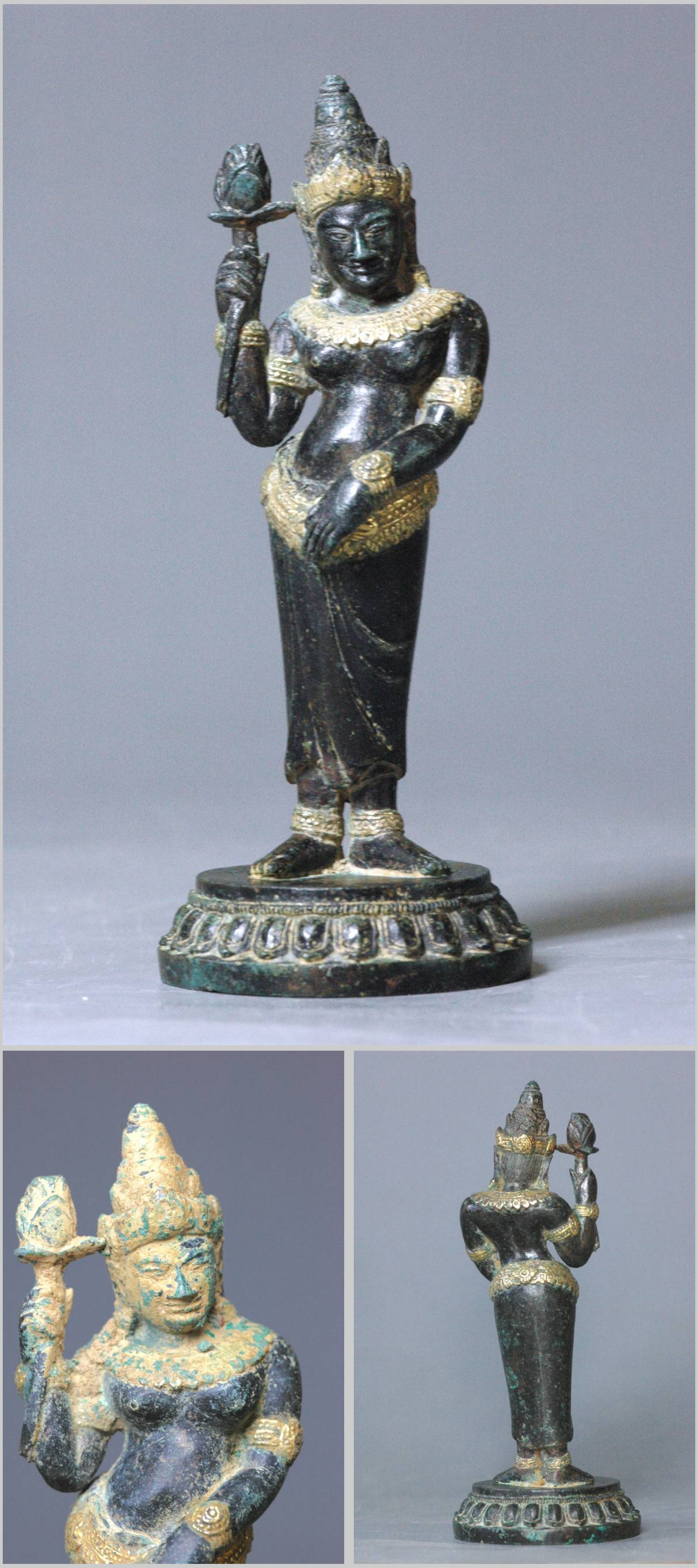
After polishing the surface, I protected it further from oxidation by using a coating of solvent soluble acrylic resin. This prevented the need for further polishing, resulting in the removal and flattening of the silver surface. I did not replace the missing silver near the bottom of the base and left the resin core exposed.



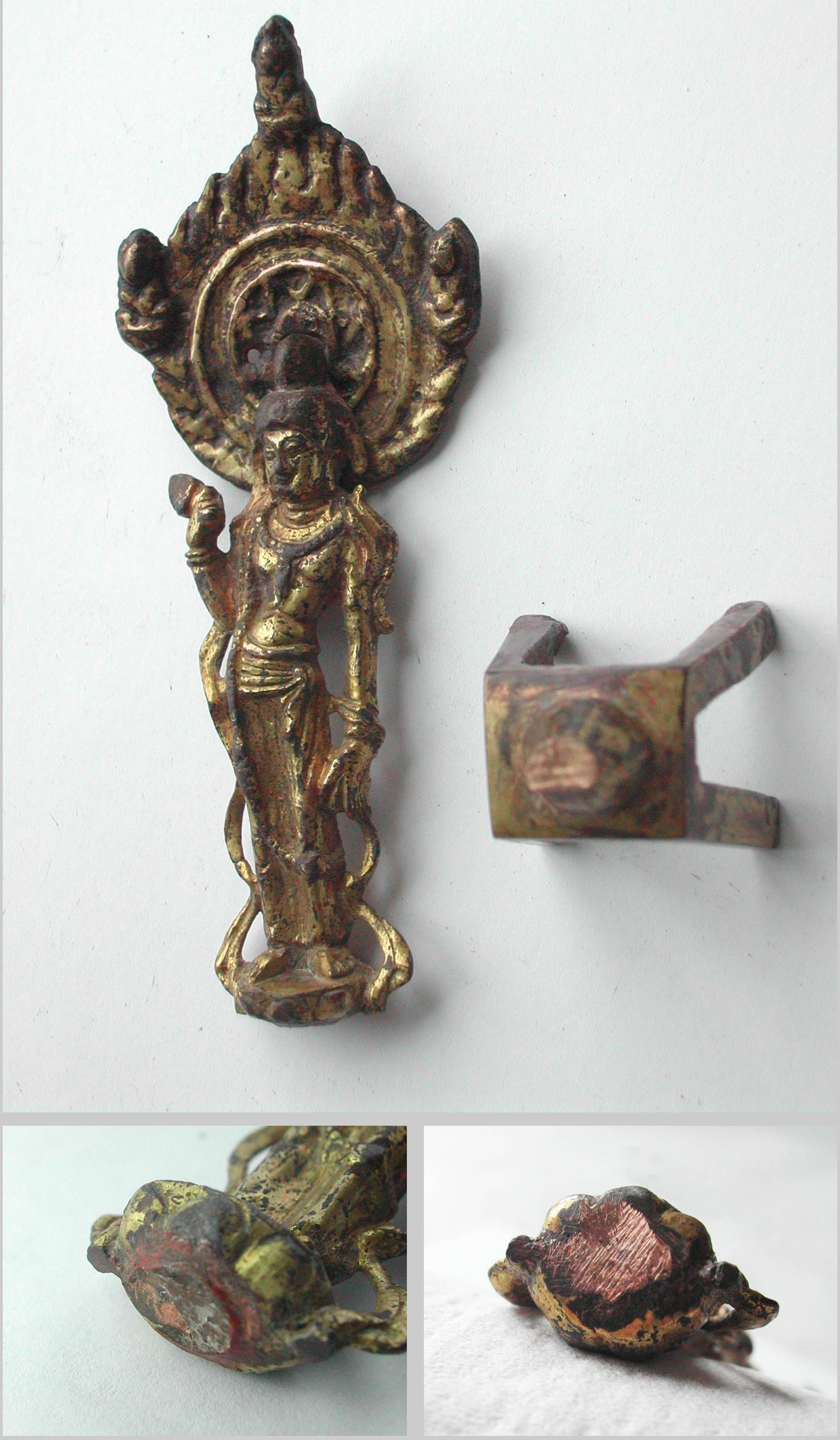
Miniature Vajrasattva Headdresses, 19th Century. Silver with gold alloy appliqué. The silver has some oxidation but not the gold alloy. There was no burial debris or major damage. The helmet came with an unsightly acrylic mount. This was replaced with a square wooden base and a brass rod. Both were coated in black. The helmet was loosely placed on a rigid polyethylene covered synthetic support.



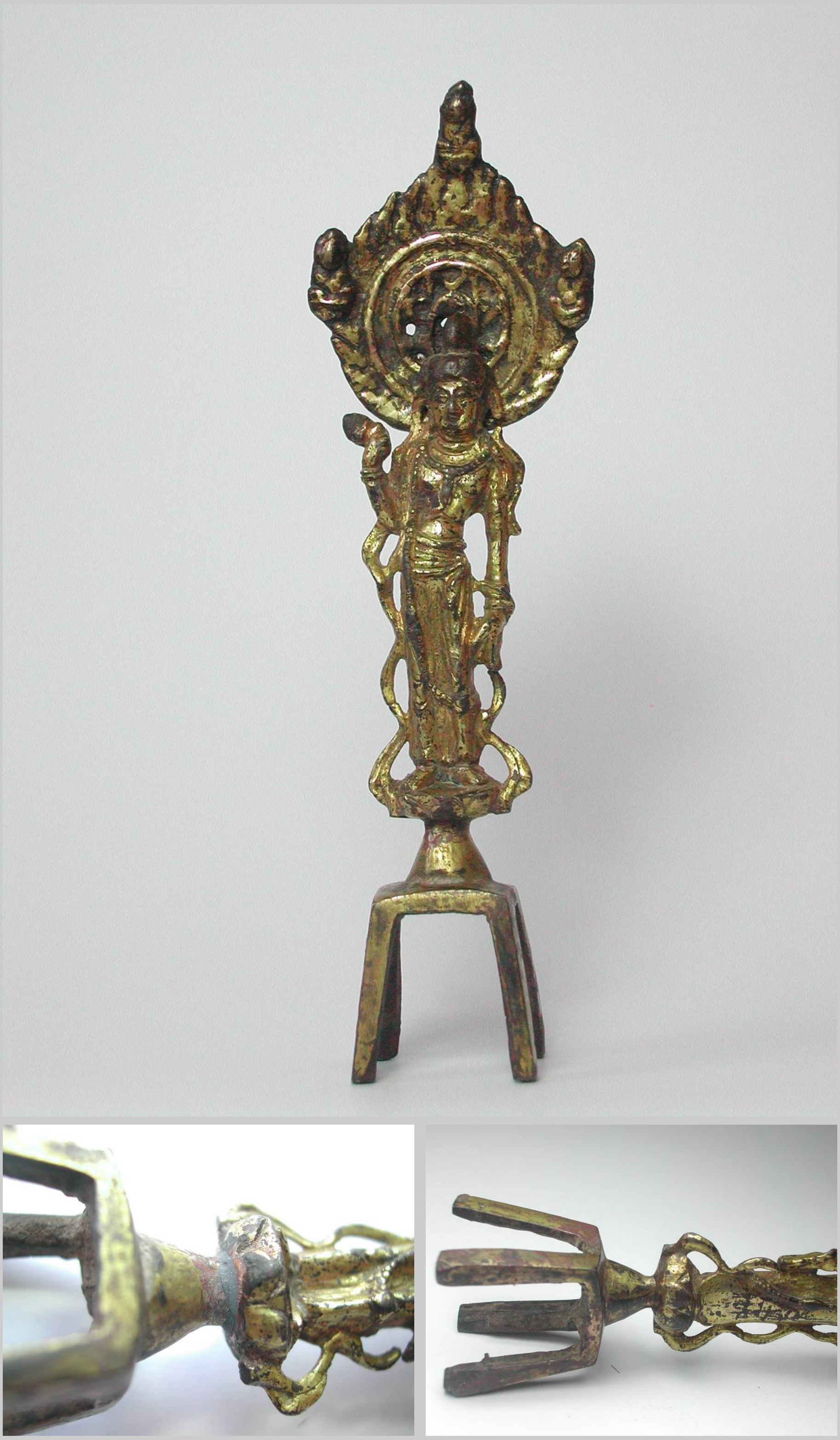
Female Gilded Bronze Figurine, Cham, 9th Century, Vietnam. The figure was encrusted with corrosion and soil.



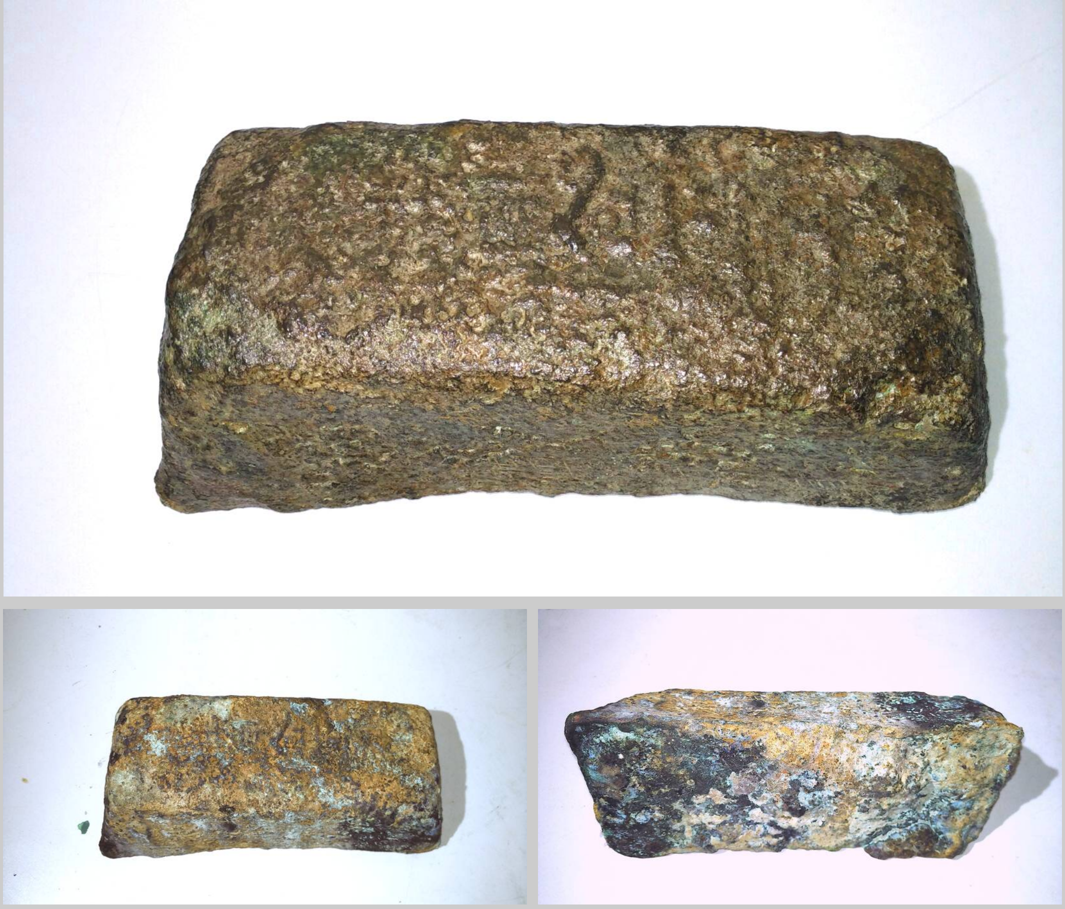
The bronze was mechanically cleaned under a microscope and stabilised with a corrosion inhibitor. For further protection the surface was coated with a synthetic reversible coating.



Copper alloy gilded Bodhisattva Avalokiteshvara (Guanyin), Tang dynasty (618-907 CE).The base of the figure fractured. The damaged surface had new adhesive, indicating that this was a modern restoration. After removing the adhesive, parallel running grooves from recent levelling was visible. This flattening out of the surface was undertaken to match the base from another source.

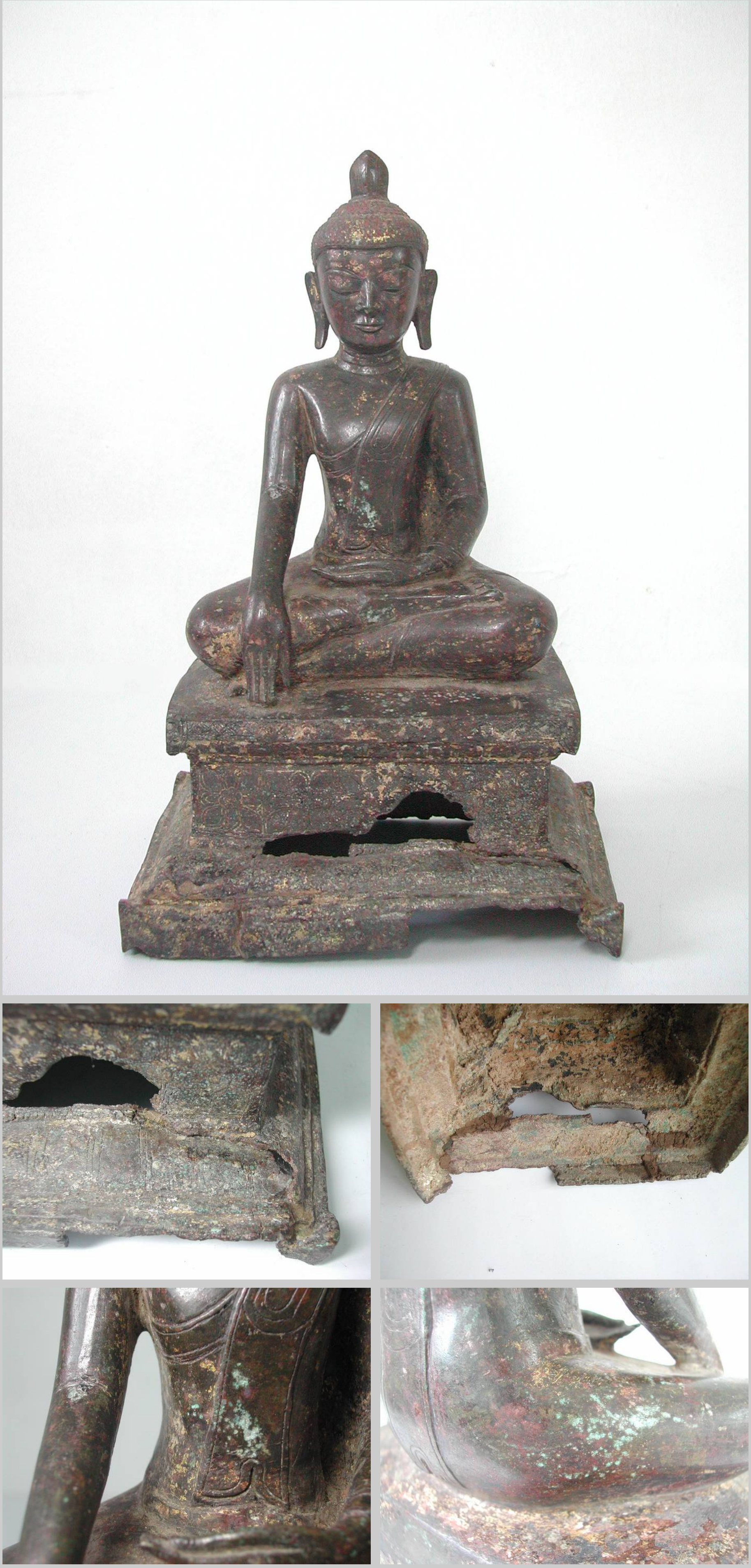


The reworked fracture of the sculpture and the base were joined with a synthetic resin that contained metal filler. The surface of the fill was levelled and colour matched using synthetic paint.

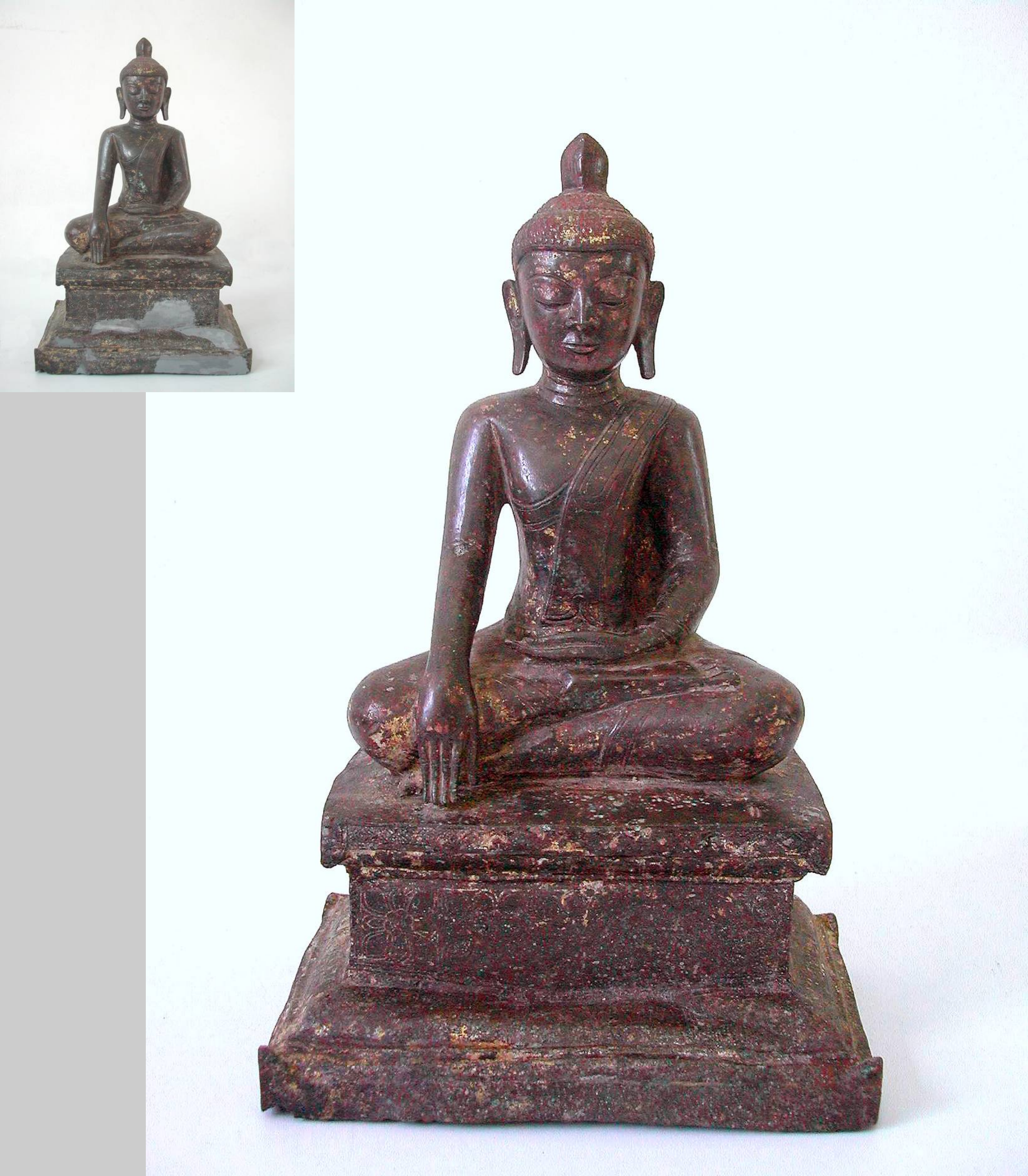


Copper ingot from the shipwreck Middelburg. This ship was a Dutch frigate built in 1607 at Middelburg. It was owned by the Verenigde Oostindische Compagnie, (East India Company). On 19 July 1617, the Middelburg, on voyage from Bantam (Banten, Indonesia) to Suratte (Surat, Hazira), was lost off Suratte.

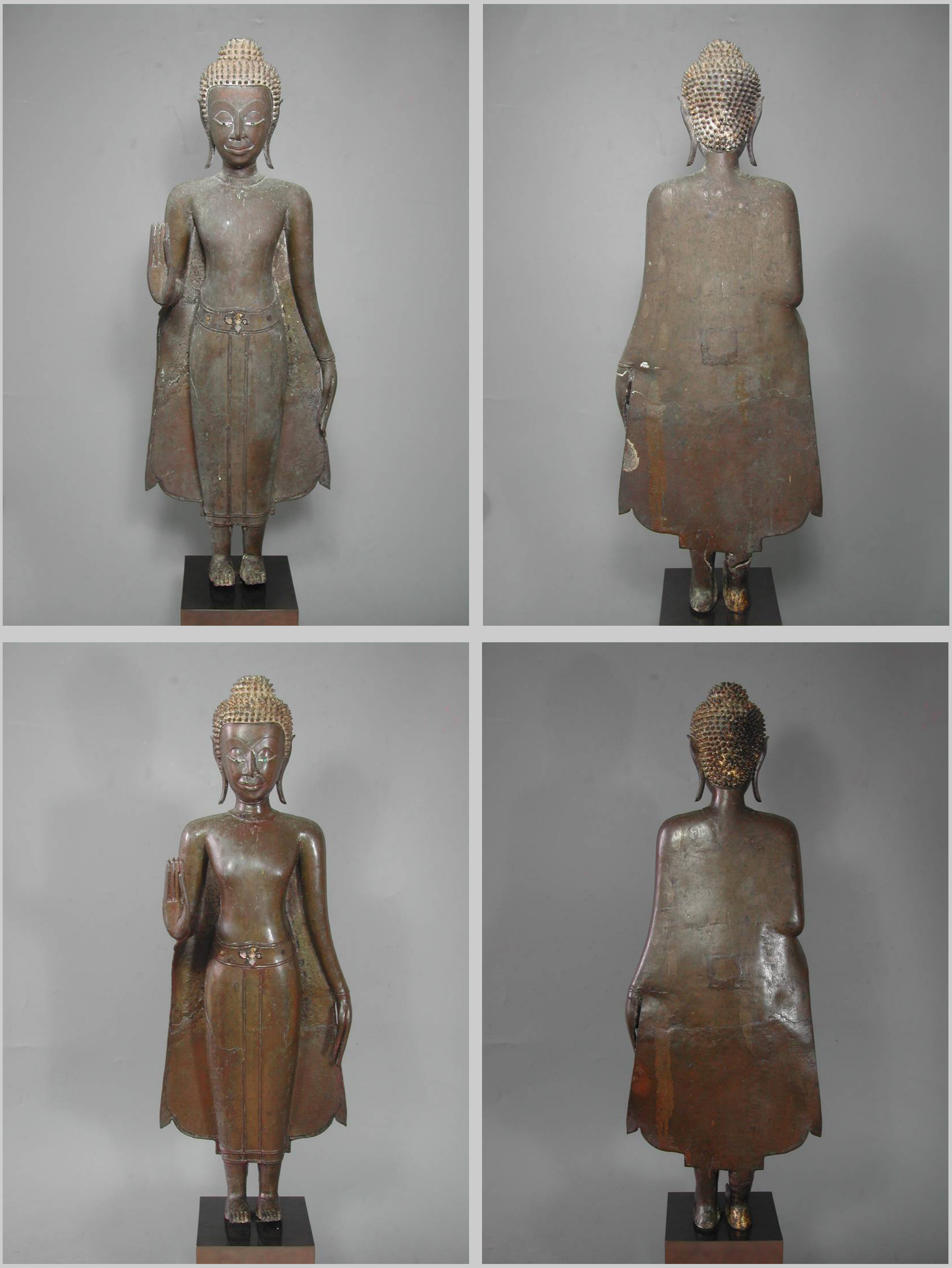
The ingot was mechanically cleaned, treated with a corrosion inhibitor and coated with a synthetic coating that can be reversed.



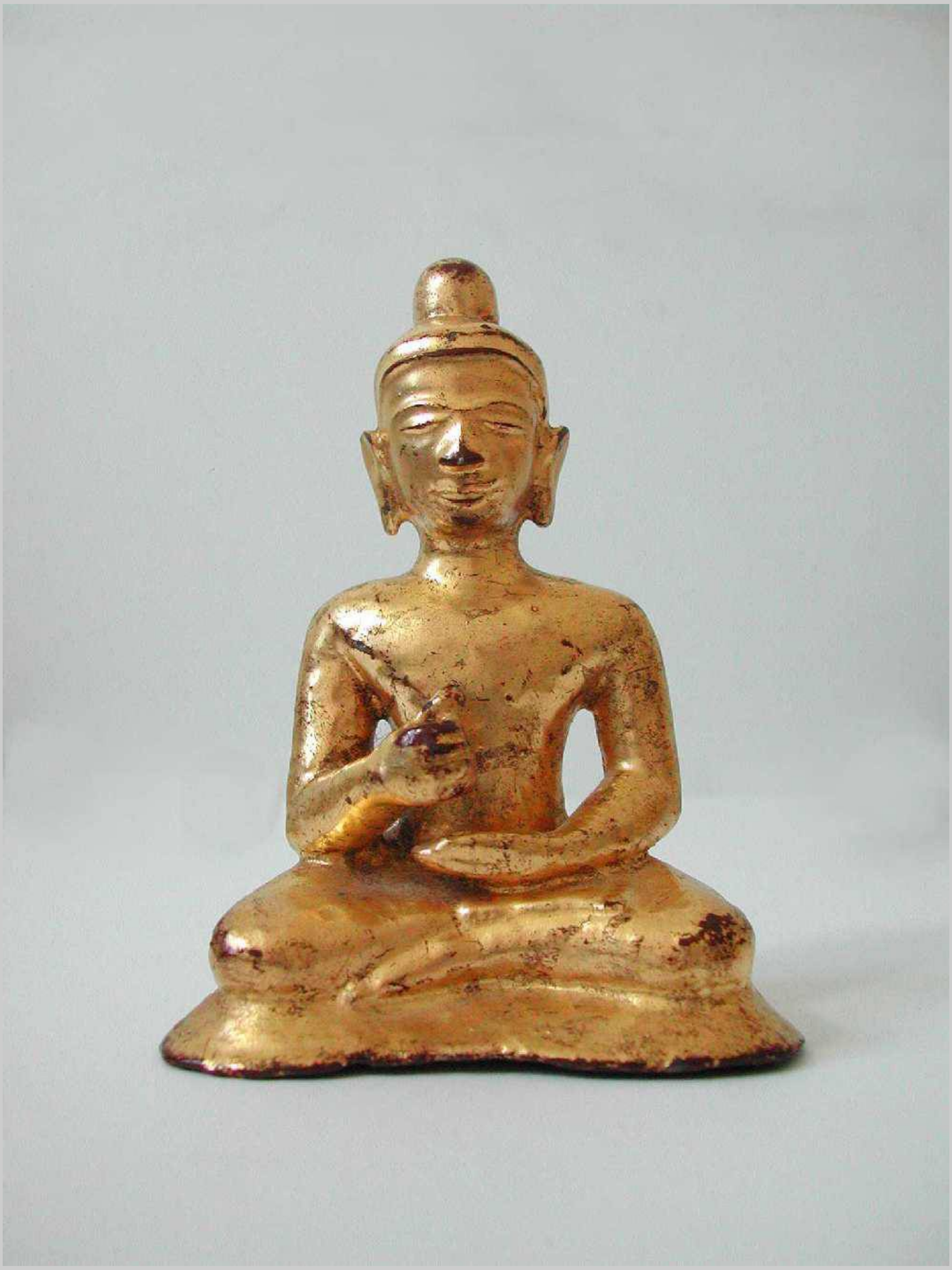
Seated bronze Buddha, from Rakhine, Myanmar. The front of the plinth was heavily damaged and poorly restored. There was also copper chloride corrosion in various areas.



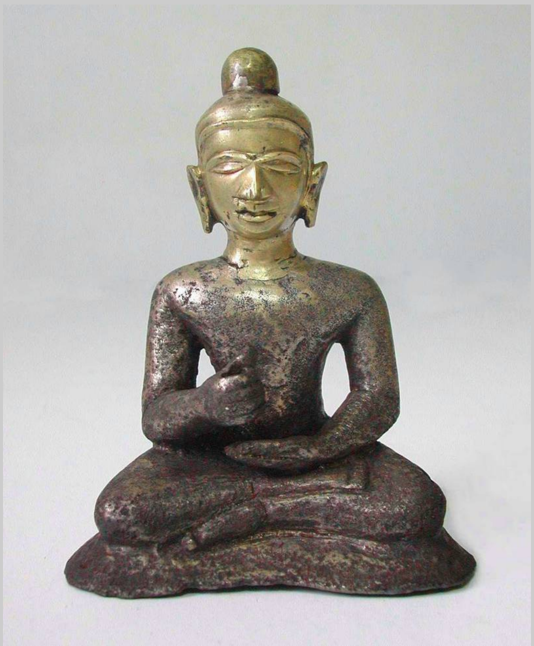
The old restoration was removed, the surfaces were solvent cleaned. The fragment repositioned and the missing areas filled with a polymer. The filler was colour matched. The chloride corrosion was treated with a corrosion inhibitor and the surface of the sculpture coated with a reversible protective coating. There was no attempt made to align the mineralised and distorted fragment, since this would very probably have resulted in a new fracture and loss of original material.

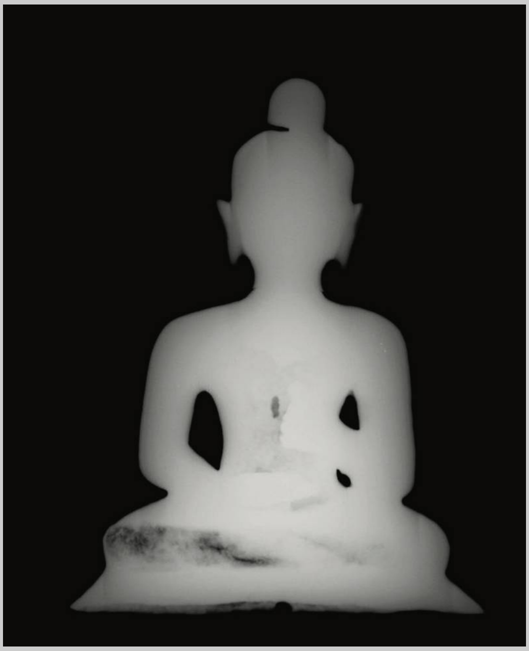


Bronze standing Ayutthaya Buddha, ca. 17th century. The sculpture was rather neglected. The surface was cleaned with solvents and stabilised in some areas with a corrosion inhibitor. The surface was then coated with a sacrificial organic coating.



I understand from information available to me that the Arakan Seated Buddha was made in the 16th or 17th century in Burma. The figure is 102 mm high and its surface was recently reworked. The newly applied gilding is so extensive that any definition and detailed features of the face and other parts are completely lost. The original lacquer that covered the metallic surface of the Buddha, however, did not extend into the hollow cavity on the underside. The underside displayed oxide corrosion found on archaeological bronzes. After discussion with the owner I removed the recently applied lacquer and gilding.

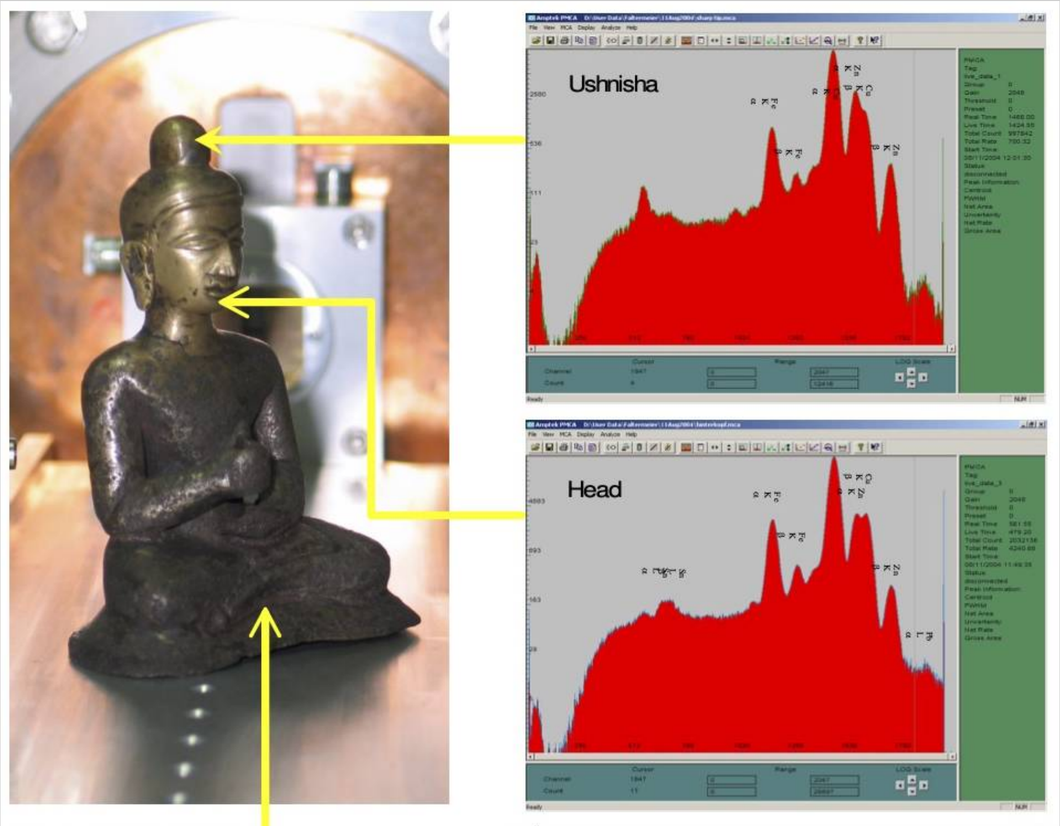


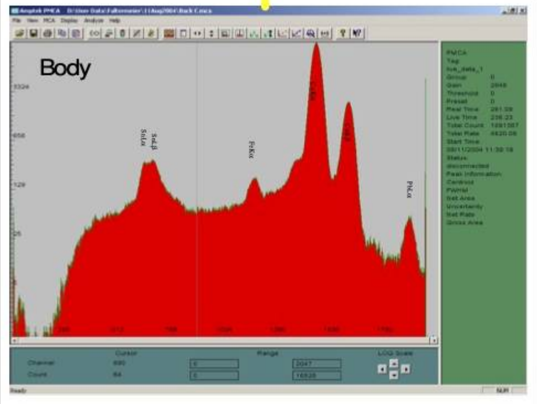


From the neck downwards, the body has a silvery bronze finish. The head is a pale yellow copper colour and the prominent bump on the top of the head (Ushnisha; which refers to his wisdom and openness as an enlightened being) is a yellow, slightly green tinted colour. The surface of the body up to the neck is very rough and is covered in pitting corrosion. This type of corrosion is to be expected from an archaeological bronze. The corrosion pits are lined with the natural occurring black copper oxides.

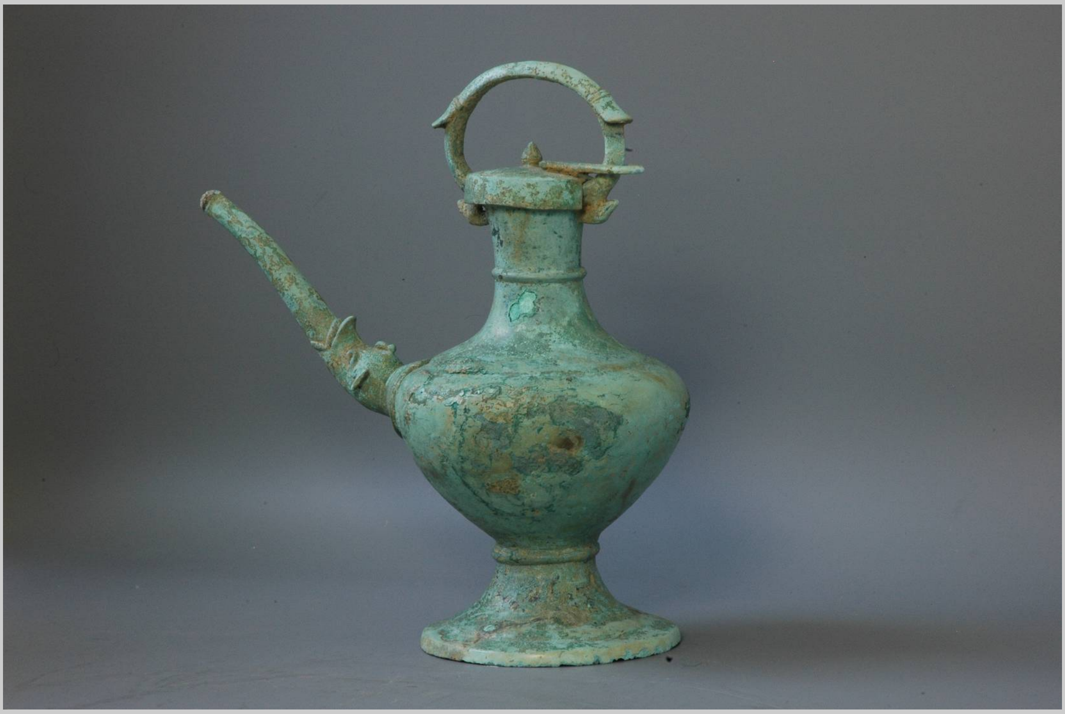
The upper part of the chest, shoulders, neck and head, are covered with scratches from filing and working the surface. There are 2 sets of scratches. The first, only found on the body, have the same black oxide corrosion as the pitting. Indicating that they are from the same period as the pitting, therefore ancient. The second set of scratches increases along the neckline and run from the chest, over the cast line into the head and are not corroded at all. This means they are more recent.

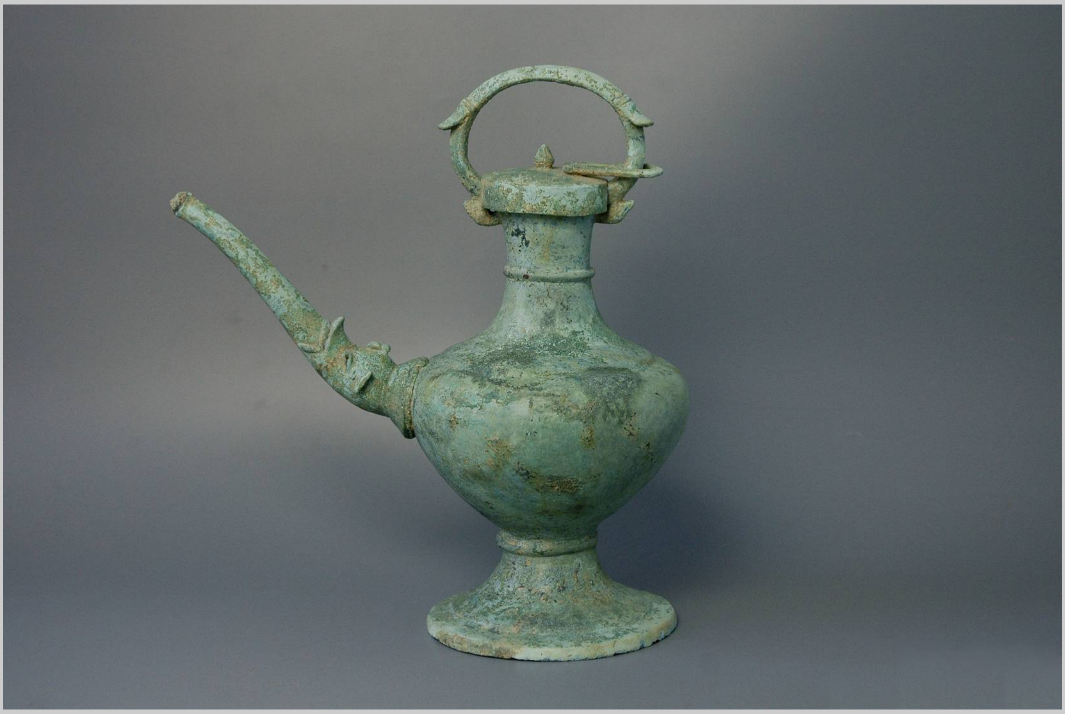
The X-ray revealed some of the technology applied. The centre of the body and legs was less dense in composition indicating, like other classic bronze works, that it was created by the lost wax casting process. The head is very dense in comparison to the centre of the body, therefore a solid cast. The Ushnisha according to previous metal analysis was clearly a different copper alloy and the x-ray revealed that the metal was inserted into the head at a later point, probably by drilling the head after it was cast onto the body.



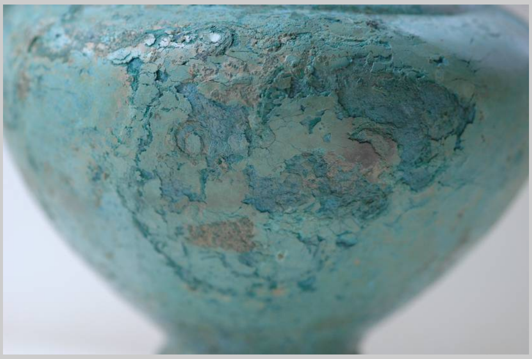


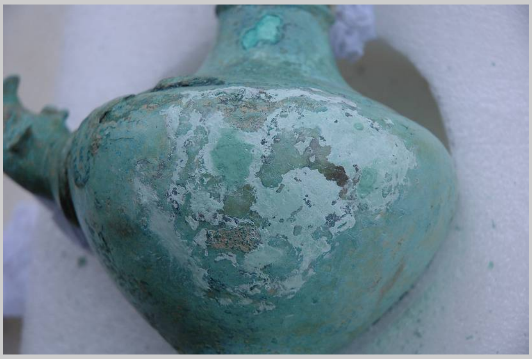
X-ray fluorescence elemental analysis were taken of the ancient body and the new additions of head and Ushnisha. The readings were qualitative and quantitative and confirmed the visual differences in alloying constituents.

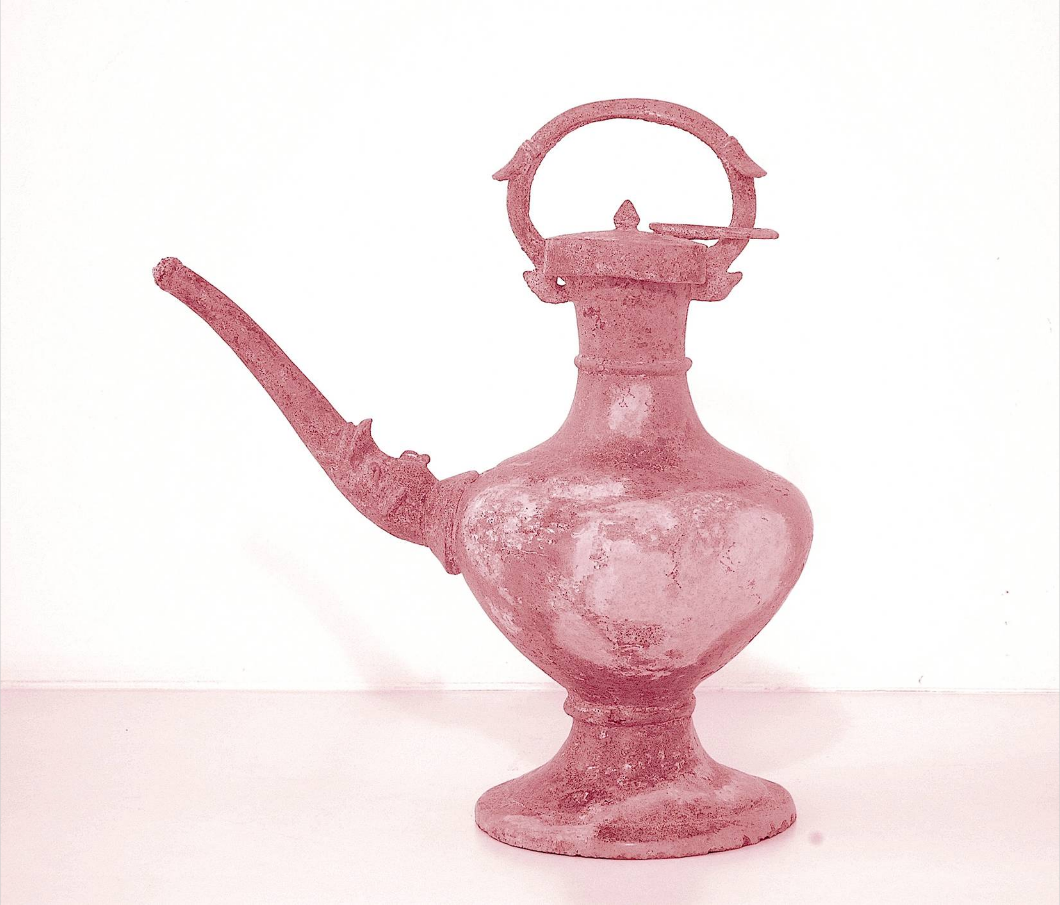




Ancient Vietnamese teapot. The surface was highly chloride corroded. The corrosion was very flaky and was lost in numerous areas.

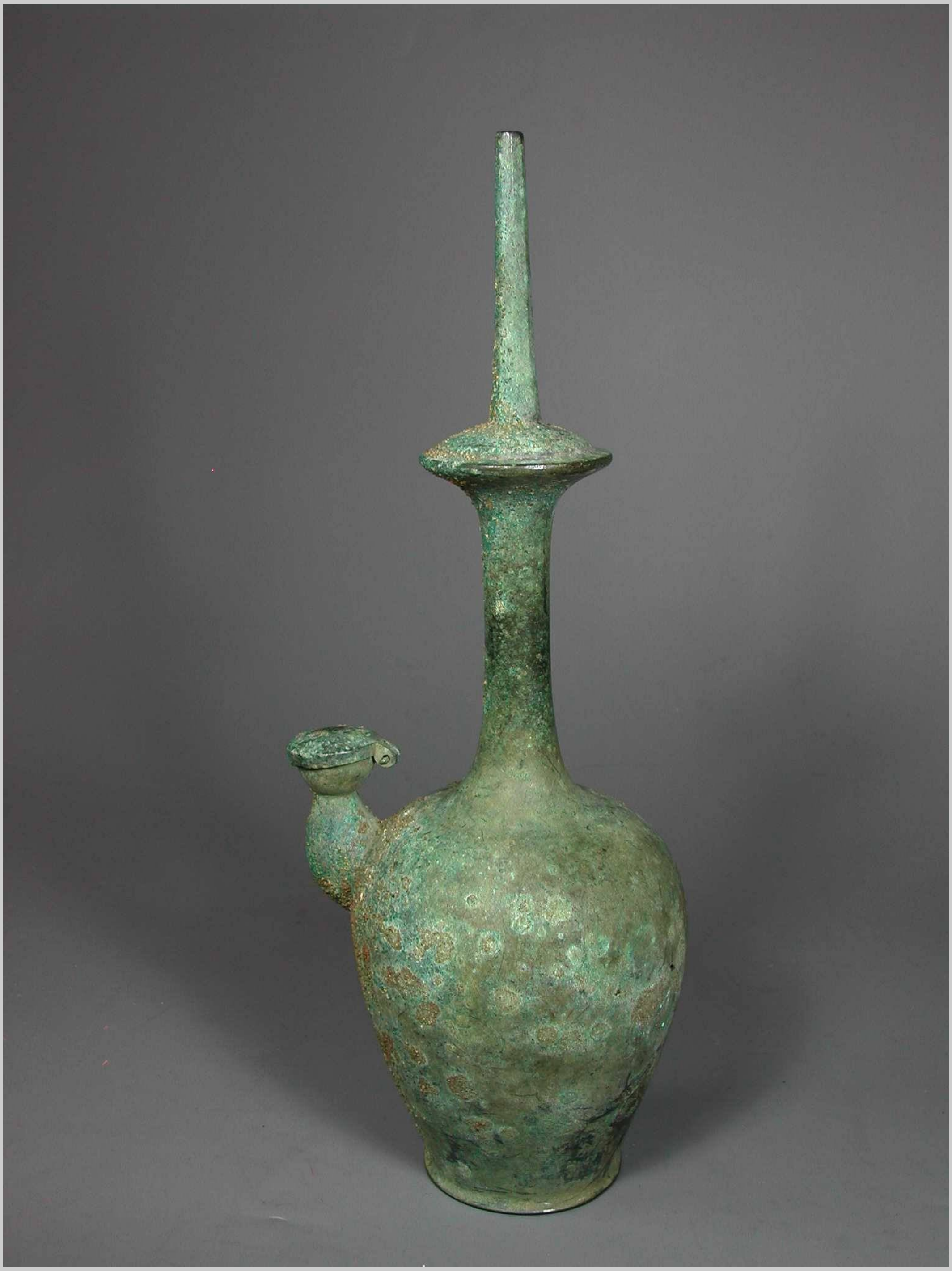




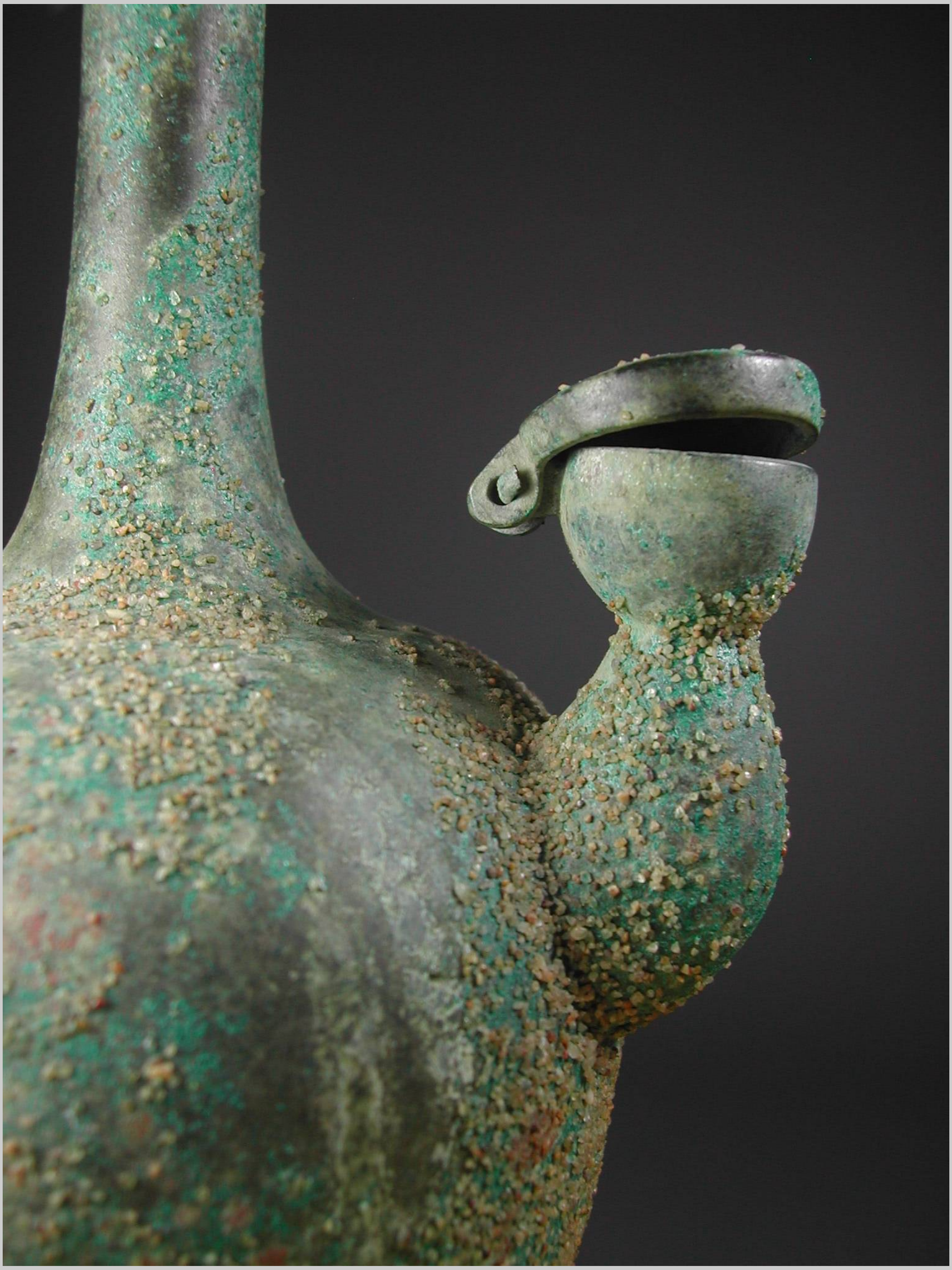


The flaking corrosion was consolidated with an acrylic resin and the larger and smaller missing areas filled with a calcium carbonate filler. The colour was then matched with mineral pigment containing paint. A synthetic clear coat was added. However, the artefact still needed to be displayed and stored at a relative humidity under 40%.

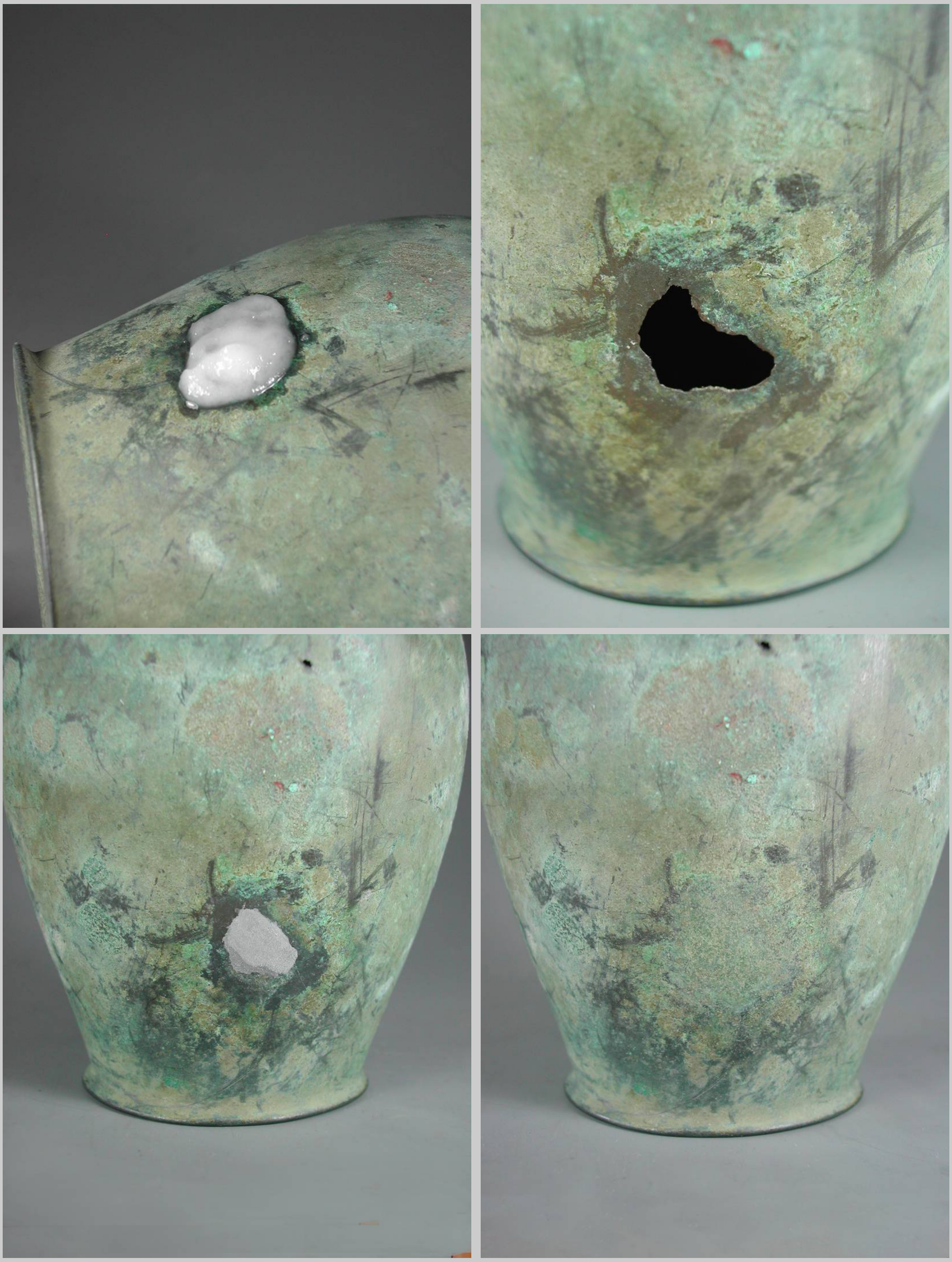
The black and white image was taken with an ultraviolet filter. This shows the restored areas in lighter hues. All modern additions can be removed with a solvent and are to international museum standards.



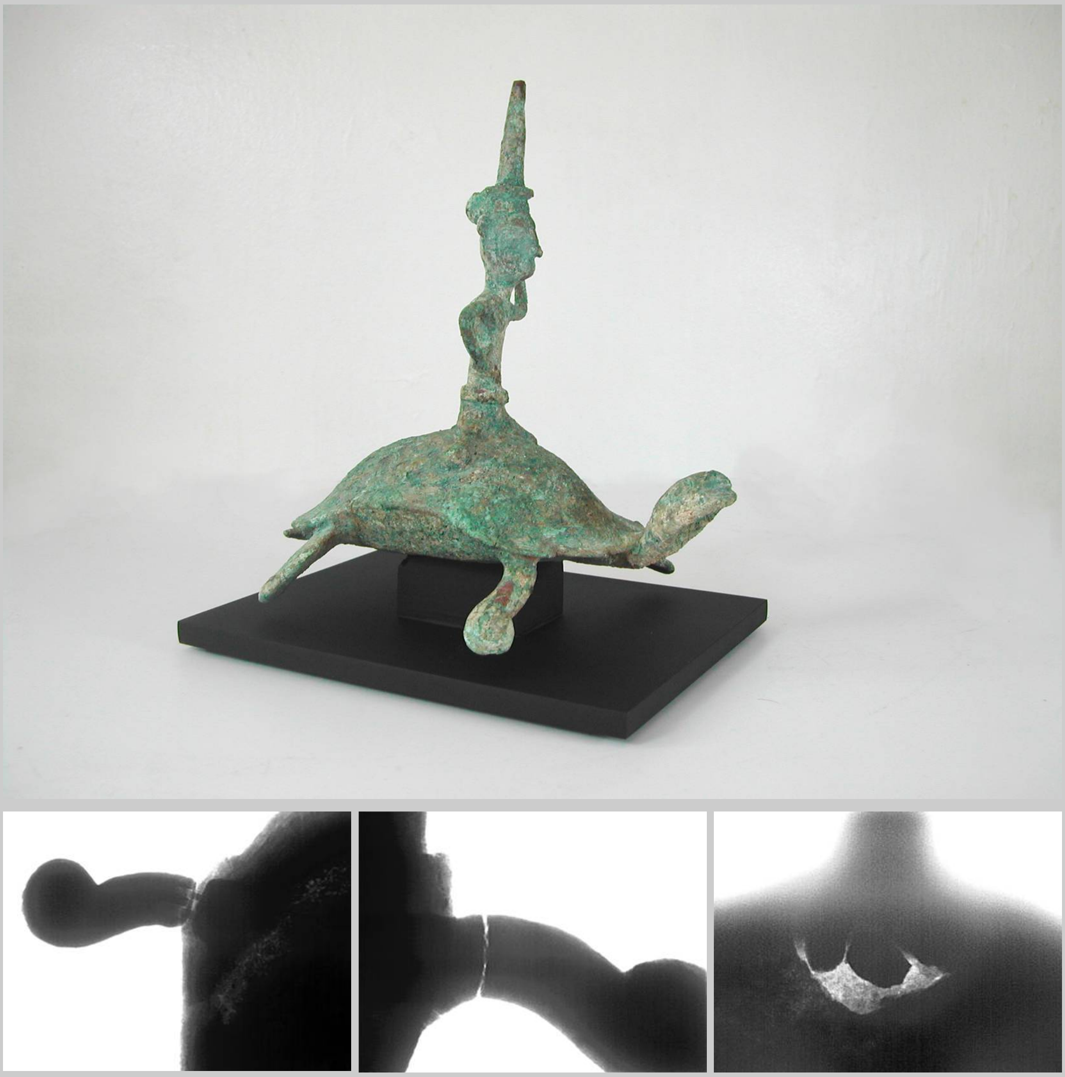
Water Ewer for Buddhist rituals (Kundika), 12th - 13th century, Korea Goryeo Period (918- 1392). The surface was corroded, covered in parts in sand grains and had old restoration.



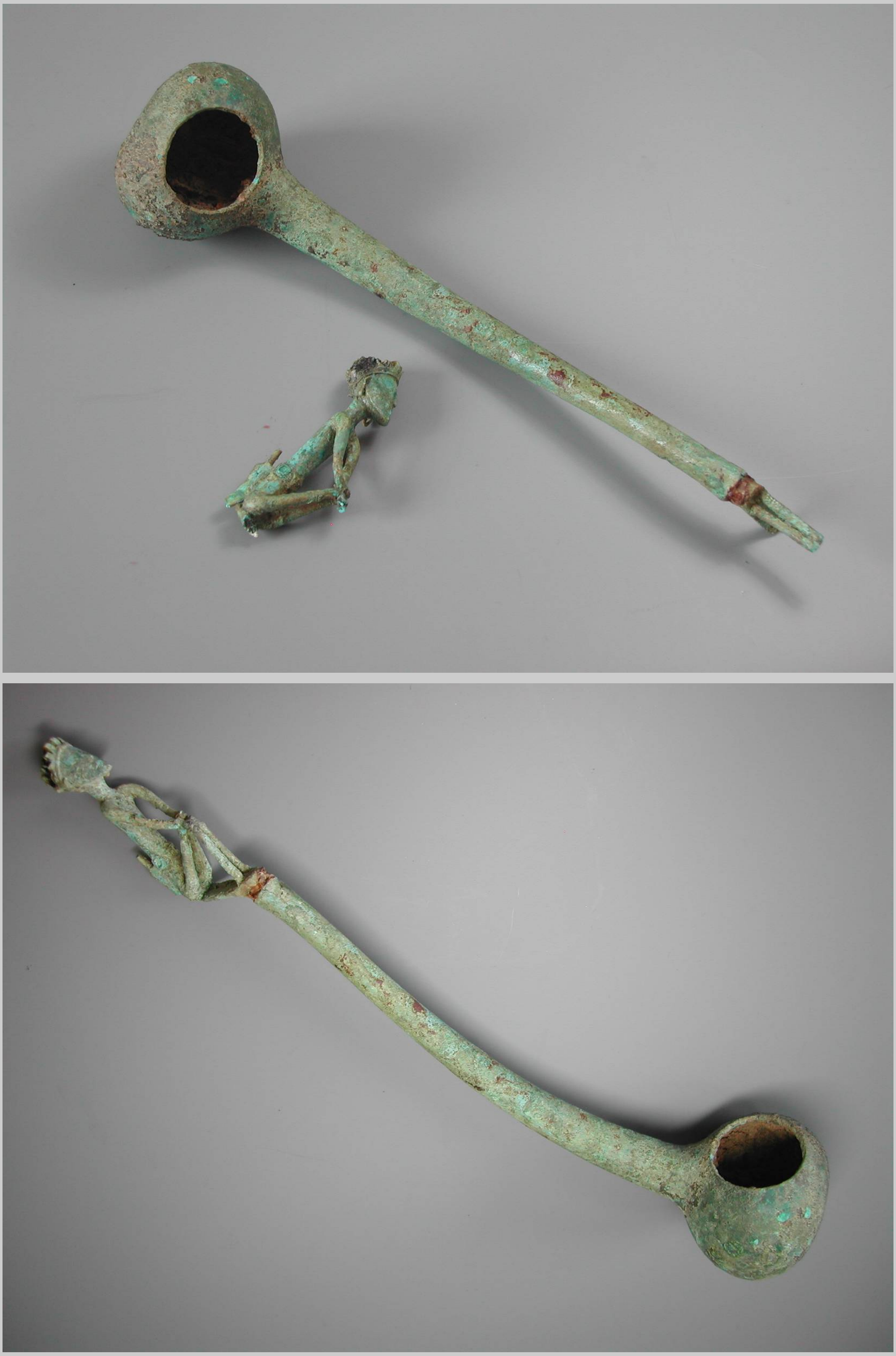
The above image shows how the sand crystals are locked naturally into the corrosion and how shallow the surface corrosion has developed. Only small areas contained what appeared to be copper chloride corrosion.



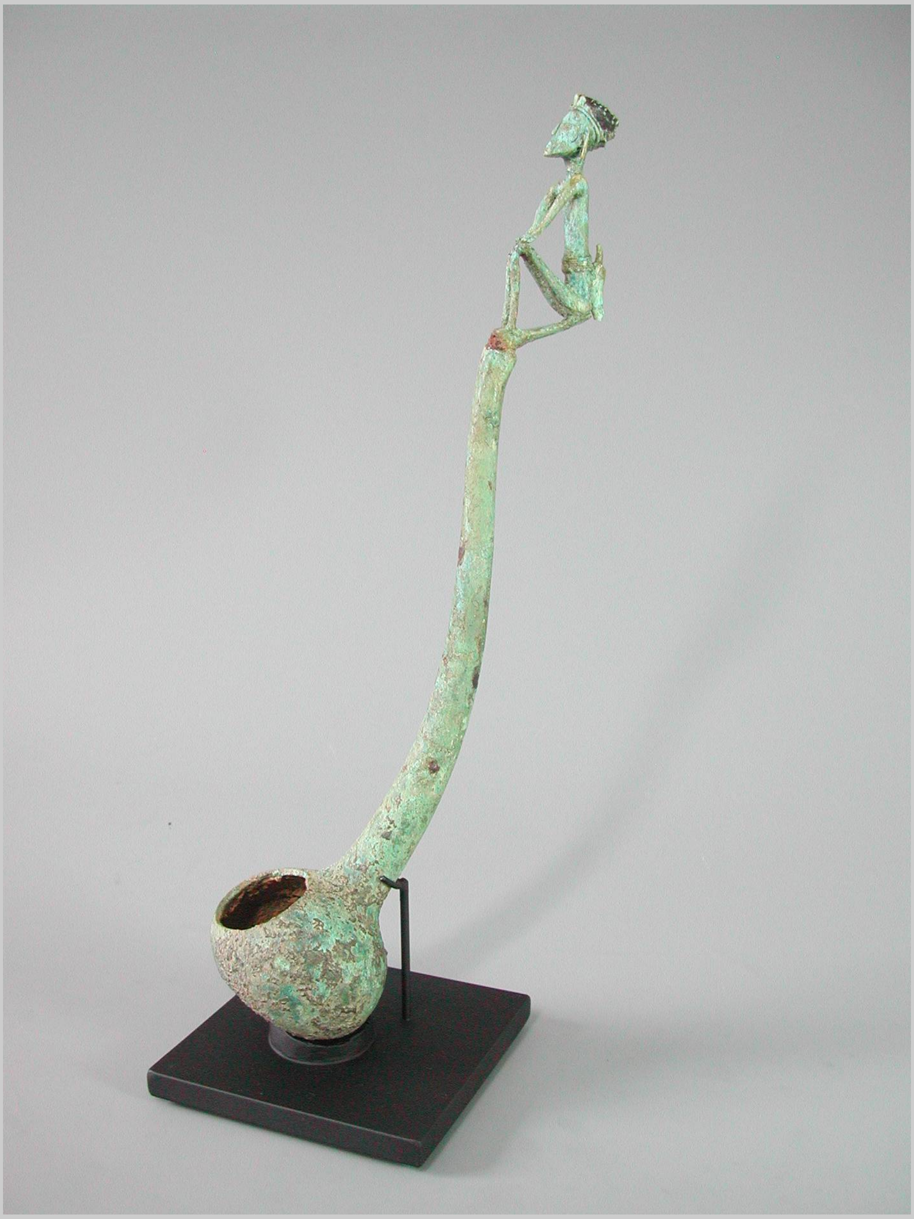
The old restoration was removed with a cellulose based solvent paste. The old hole was filled with a synthetic resin and a calcium carbonate filler after levelling the fill. The area was colour matched with mineral pigment based colours.

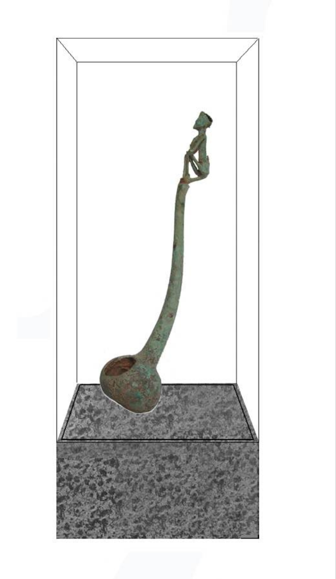


Antique Copper alloy turtle, Dong Son culture Red River Valley of northern Vietnam 1000 BCE - 100 CE. The x-rays of the bronze sculpture showed; the right front leg contained a restoration with two metal pins. The left front leg contained a fracture, that I restored with a synthetic resin and acrylic paint. There was a cavity under the rider which was cast with the animal. No other fractures were visible.



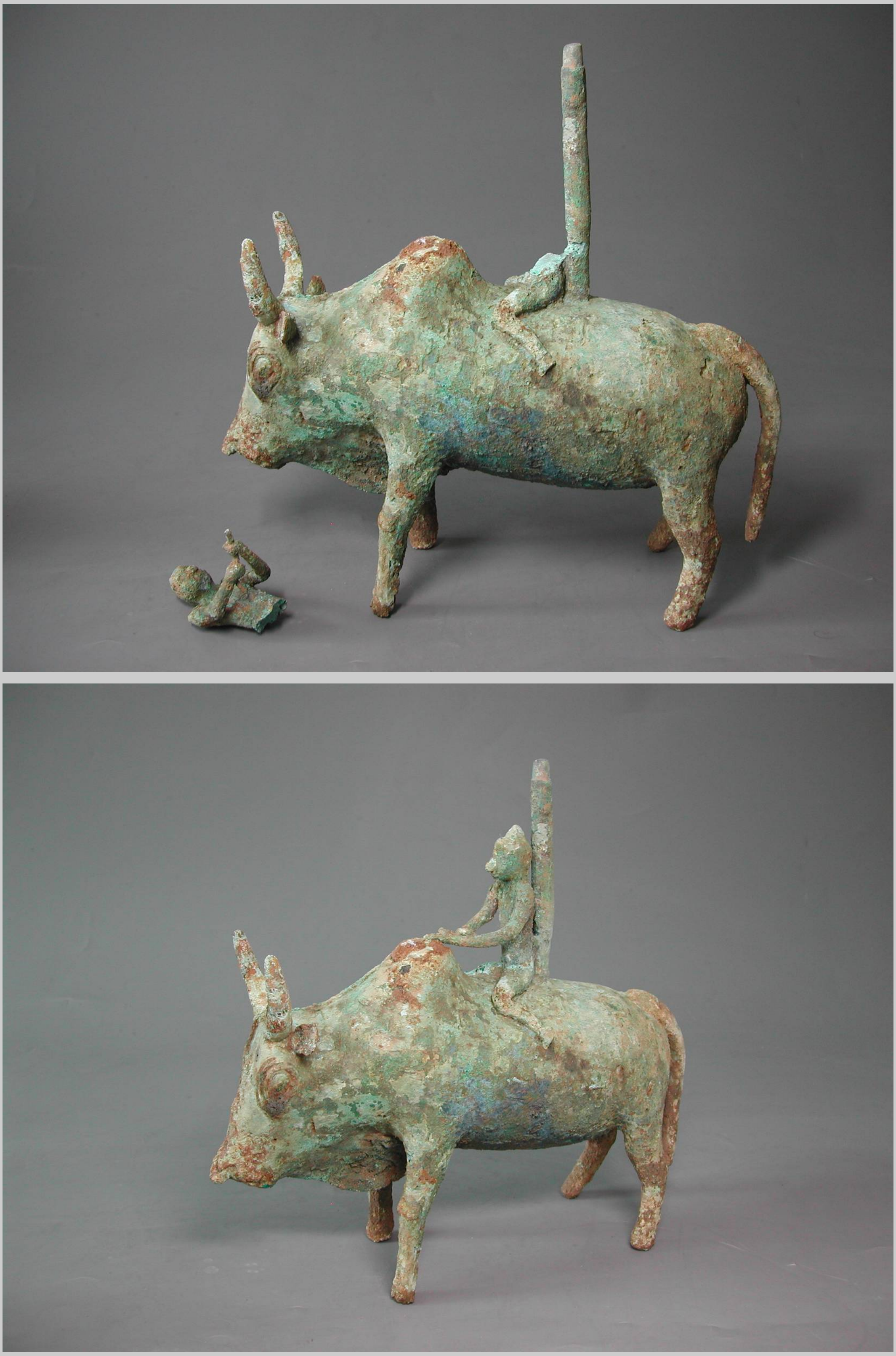
Copper alloy ladle, Dong Son culture Red River Valley of northern Vietnam 1000 BCE - 100 CE, with crouching man. The figure was fractured from the top of the ladle. The surface of the bronze was covered in copper chloride corrosion. The figure was re-attached with a synthetic resin and the missing areas retouched.



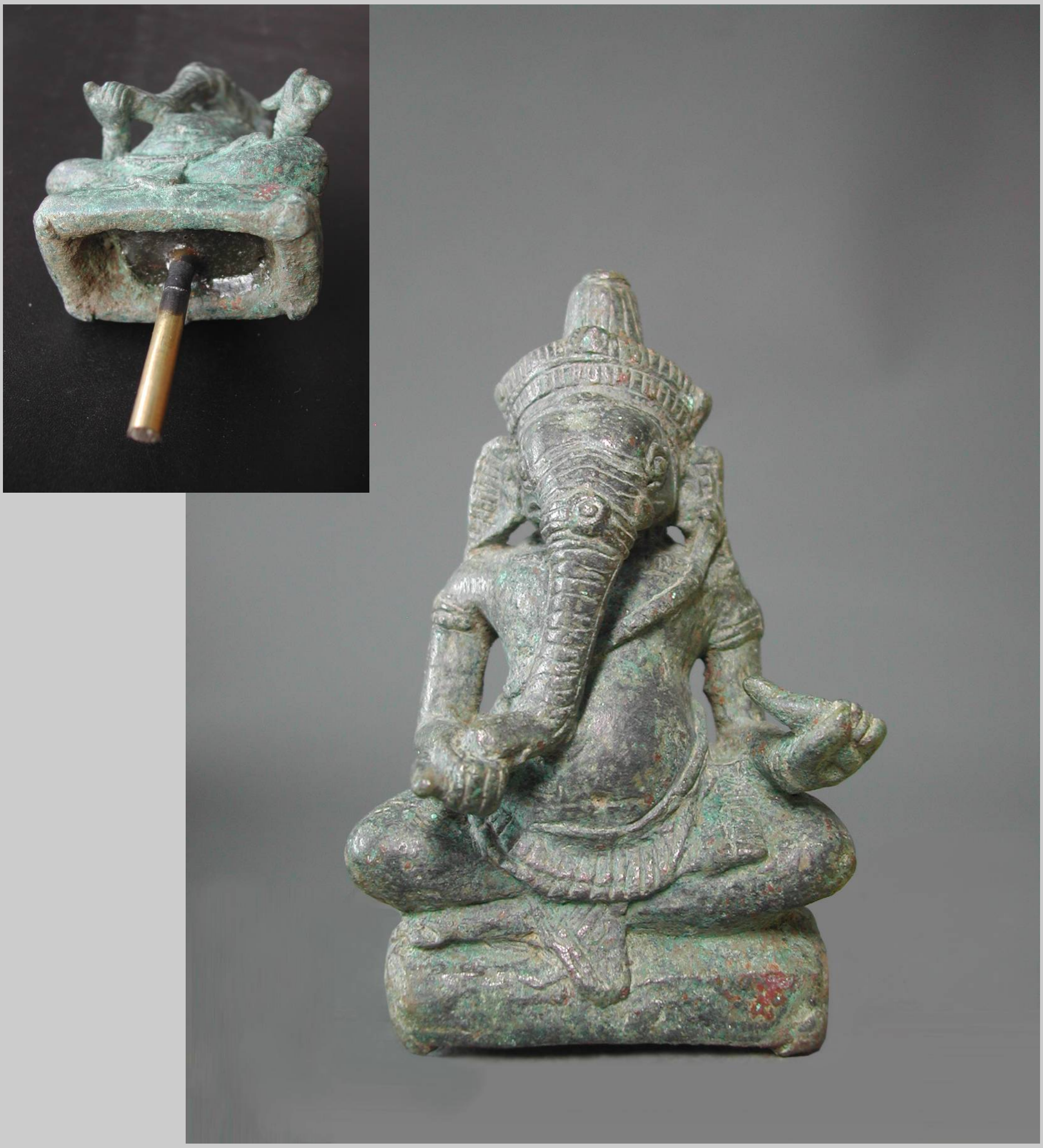


A mount and a showcase were designed. Only the mount was executed in a brass base plate, epoxy cradle and a brass wire rest. The mount was covered in polyurethane paint and the wire in a clear synthetic resin.

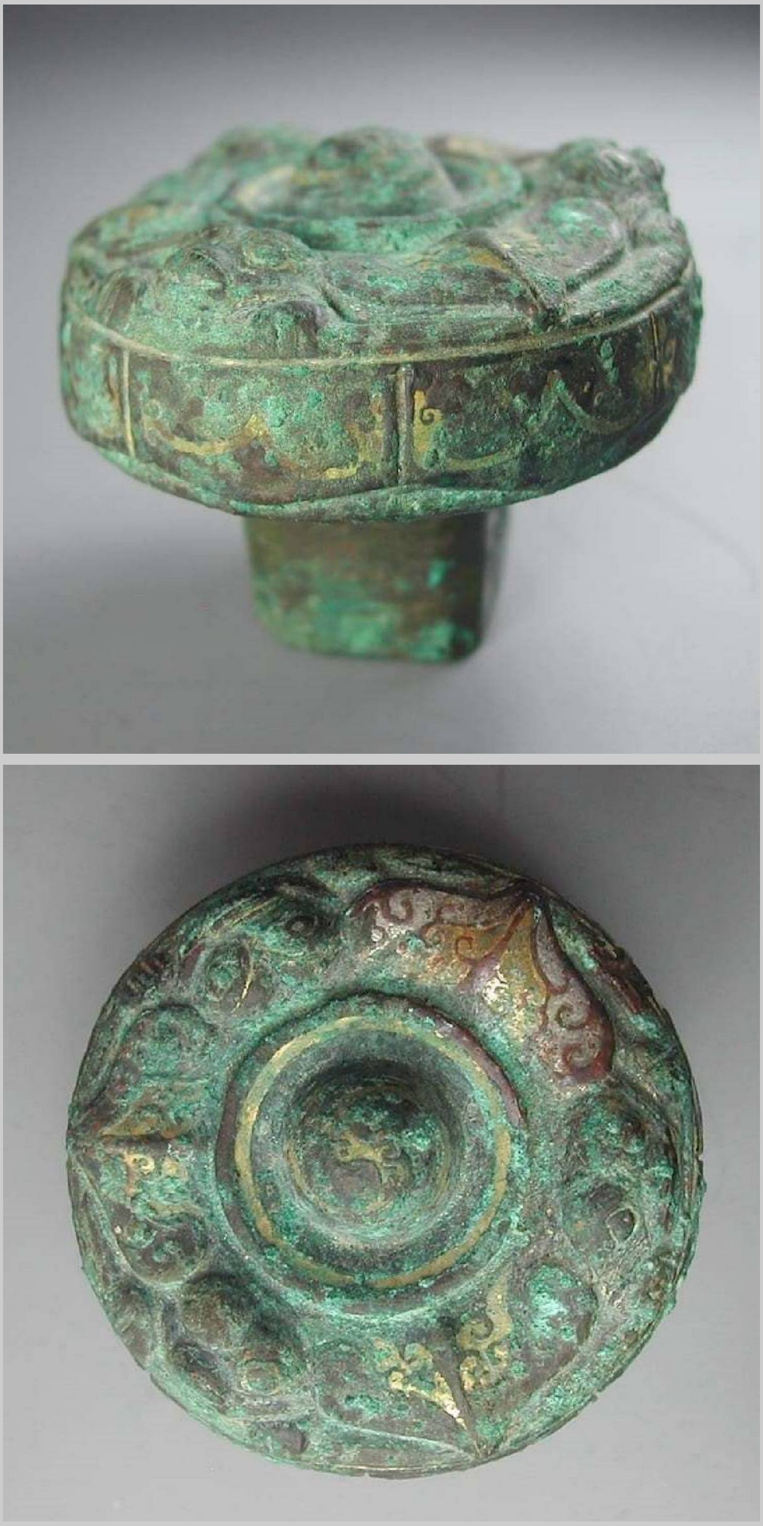
Four felt feet were added onto the underside of the baseplate to prevent damage of the supporting surface.



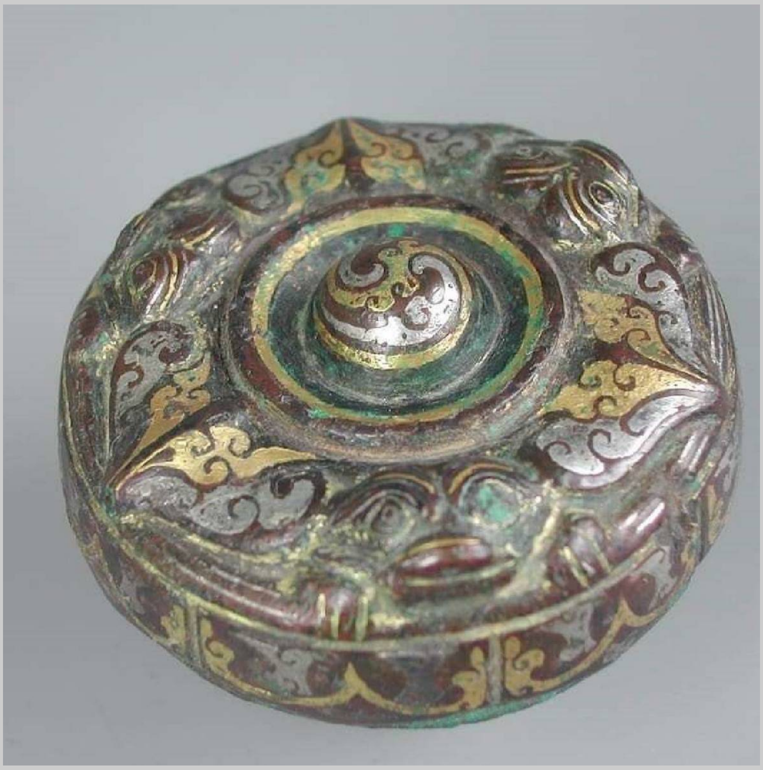
Copper alloy bull with rider, Dong Son culture Red River Valley of northern Vietnam 1000 BCE - 100 CE. The alloy has major areas of mineralisation and the rider was fractured at the waste. There is what seems ample copper chloride corrosion within the body of the sculpture that could not be stabilised. The figure was joined with an adhesive and cosmetically retouched. This object needs to be kept at under 40% relative humidity to prevent further copper chloride activities.

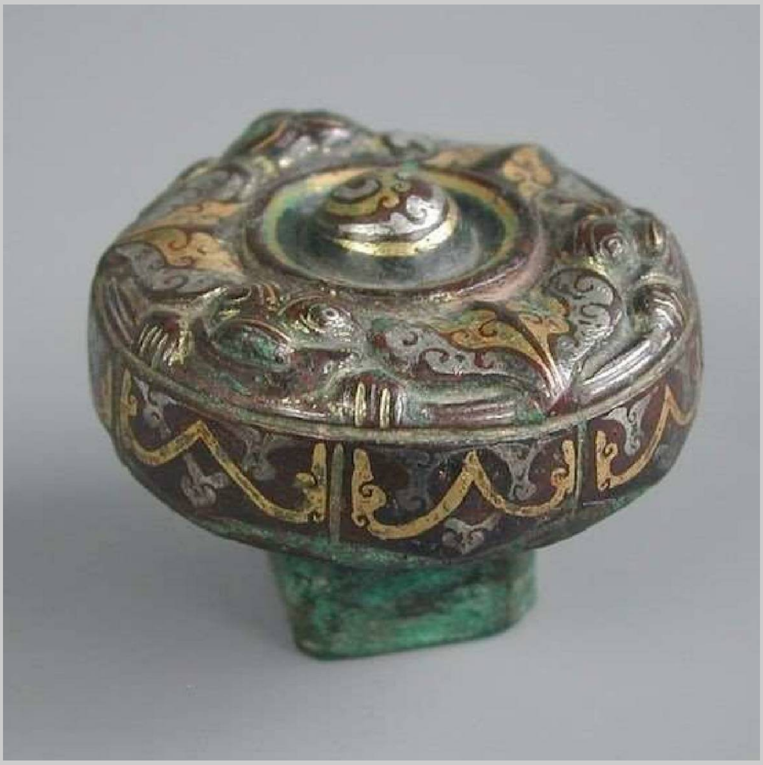


Copper alloy Khmer Ganesh. During a previous mounting of the sculpture, a brass rod was glued into the body through the underside. I extracted the the rod. The synthetic resin was removed using heat, solvents and a scalpel under a binocular microscope.

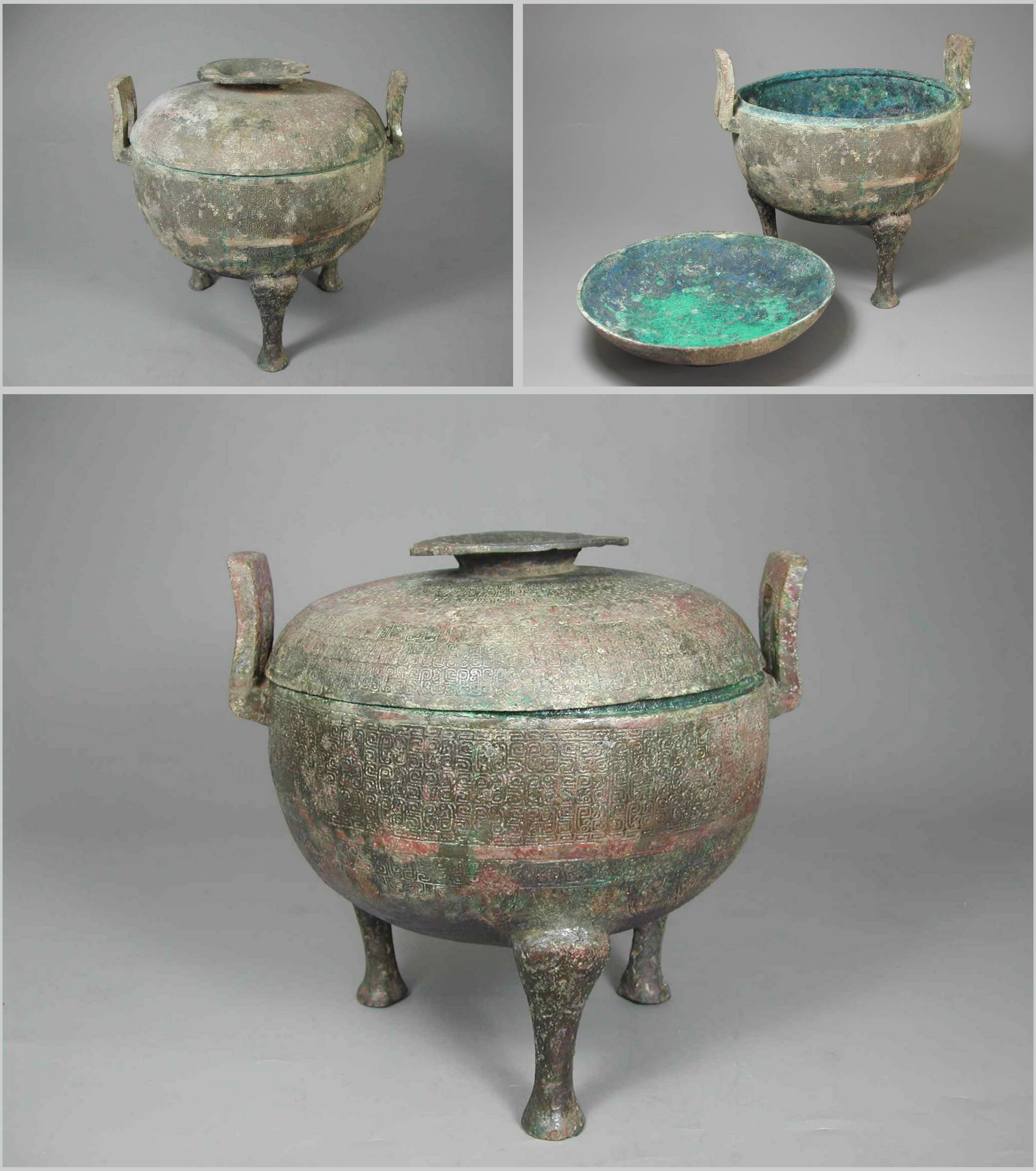


Chinese copper alloy knob for a music instrument, before conservation. Various copper corrosion products are visible, some seem to be active copper chloride corrosion, that are damaging to the metal substrate.

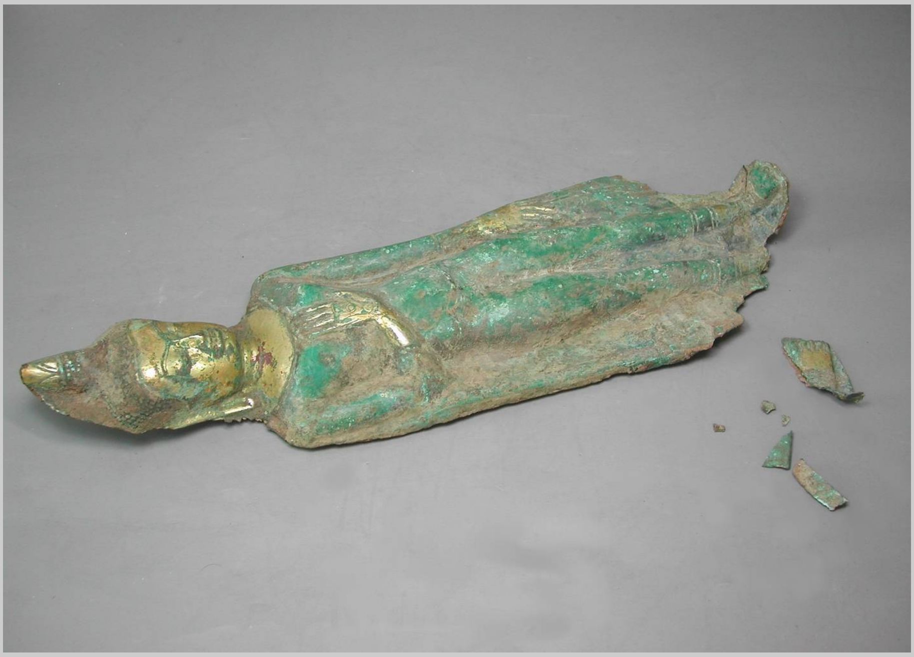


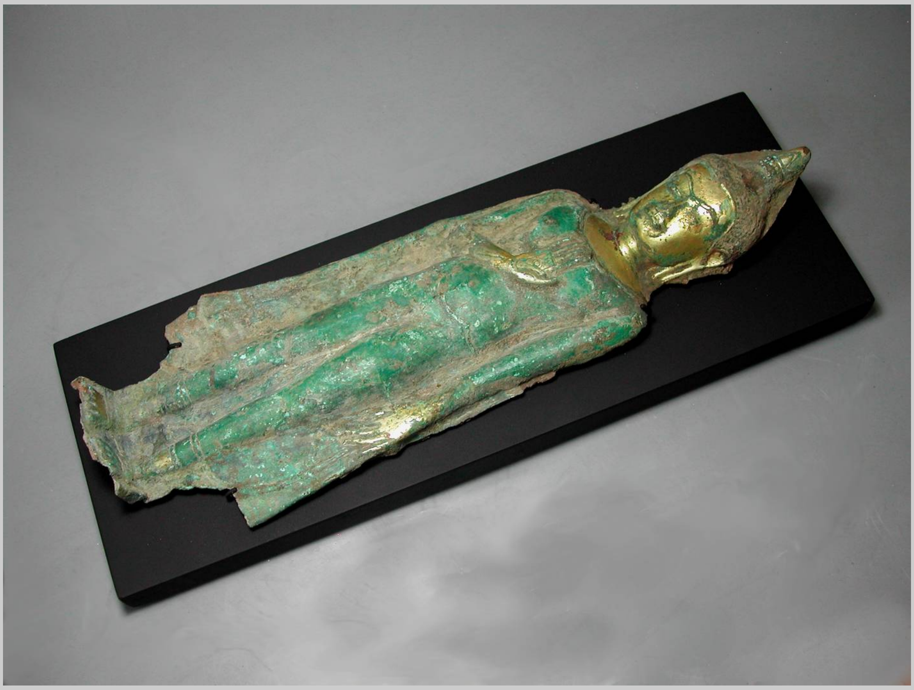


The surface was cleaned mechanically and with small amounts of complexing agent. The surface was then neutralised with deionised water and dried thoroughly in Ethanol. This was followed with a protective acrylic coating that is fully reversible.



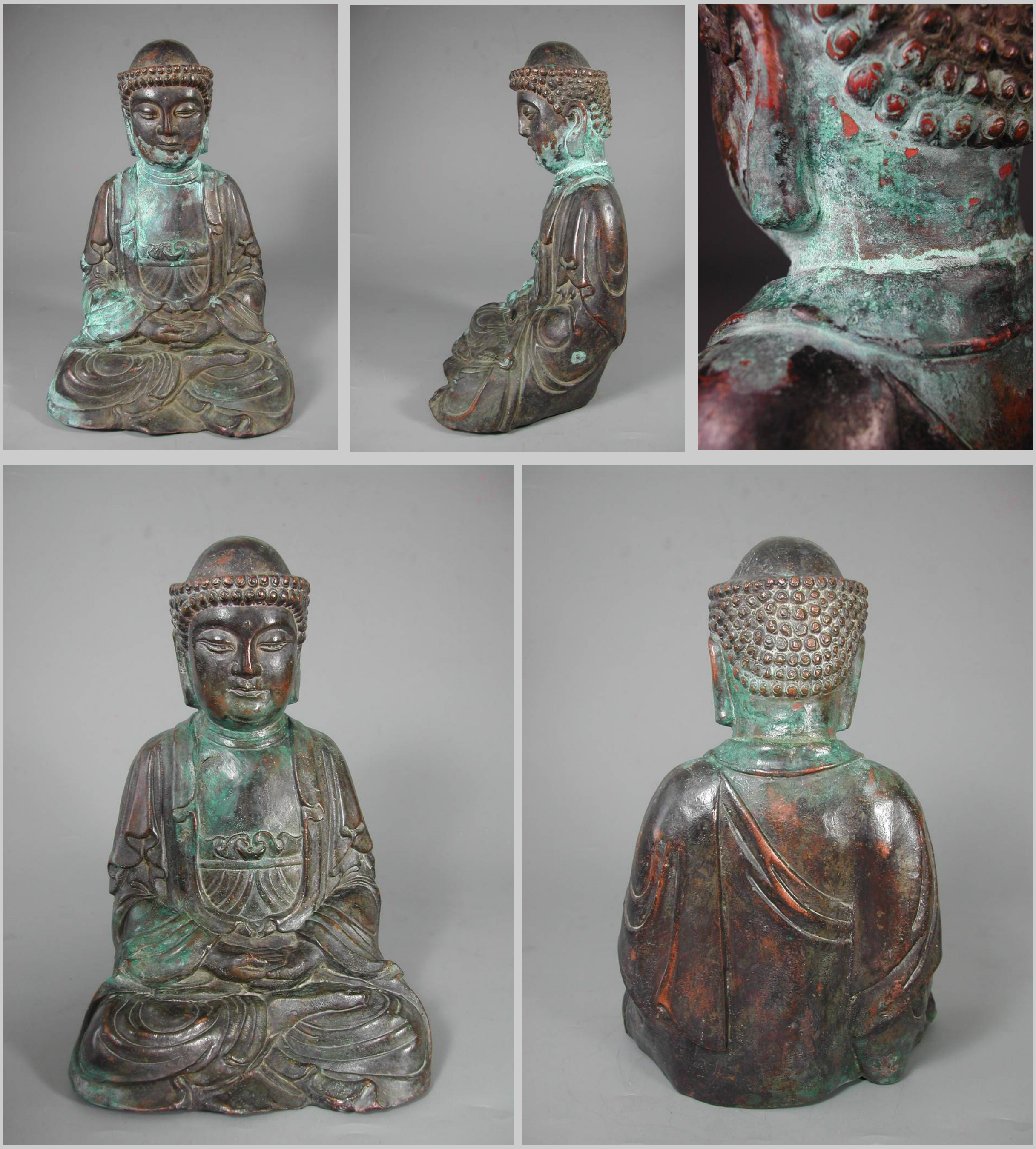
Ritual Tripod Cauldron with Cover (Ding) China Eastern Zhou. The “original surface” had burial deposits that were mechanically removed. The outer surface was cleaned with a solvent and treated with a corrosion inhibitor. The missing rim and lid handle areas were not restored to prevent confusion with earlier and later restorations. The object was then given a coating of a reversible microcrystalline wax and a light hand polish. I did not treat or clean the inside of the vessel as it contained original corrosion products that could be used at a later date to authenticate the bronze object.



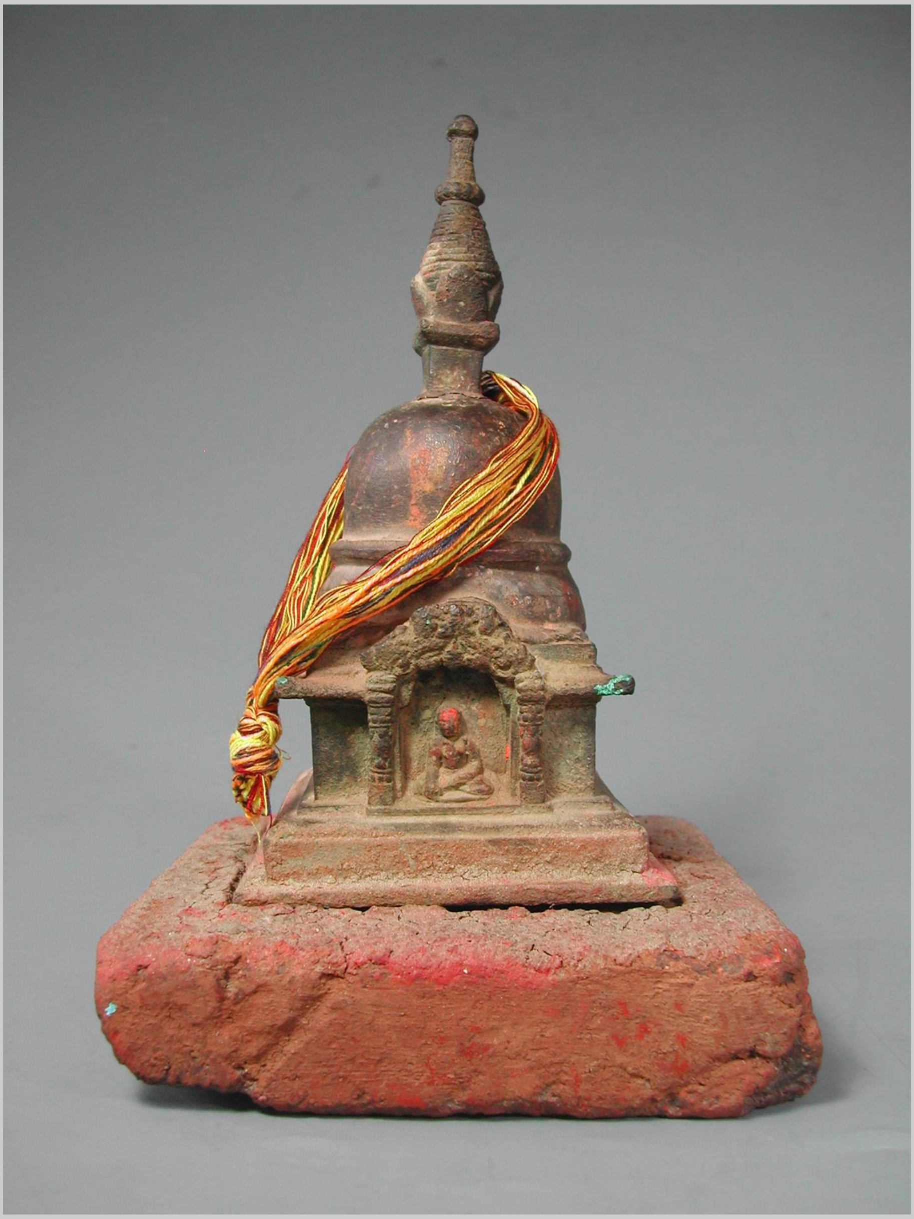


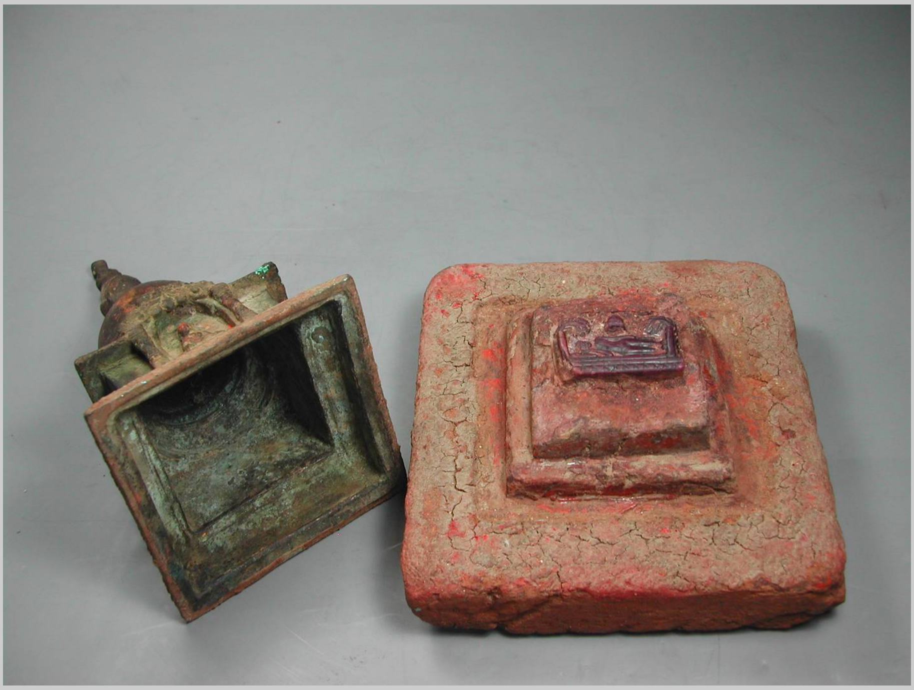
Gilded Bronze Buddha Hariphunchai 9th-10th century CE. The Buddha was heavily mineralised. During transport the proper right bottom of the robe fragmented.

The fragments were re-attached with a durable polymer resin, gap-filled and retouched with acrylic colour

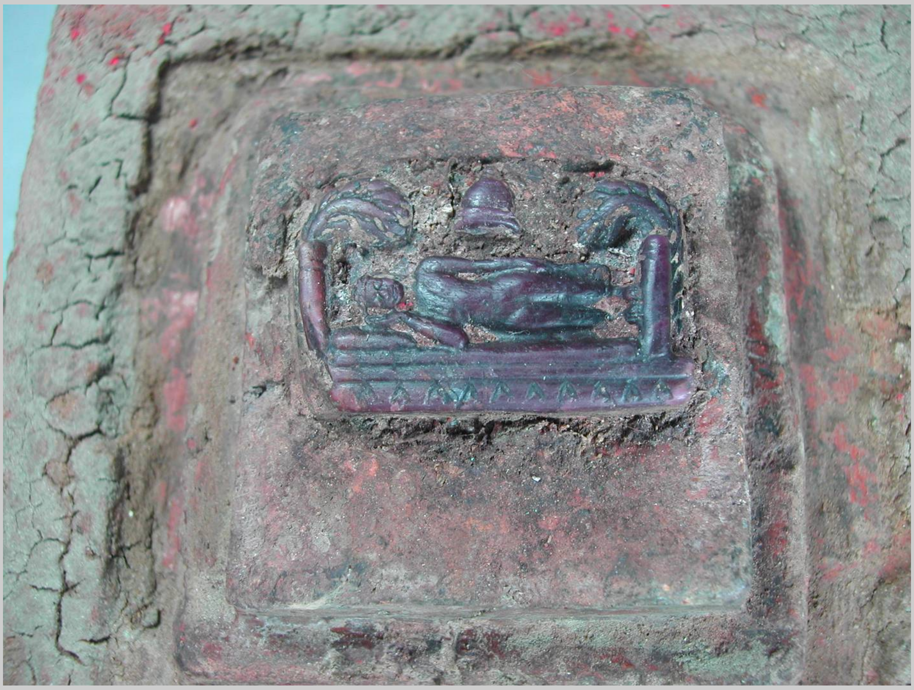


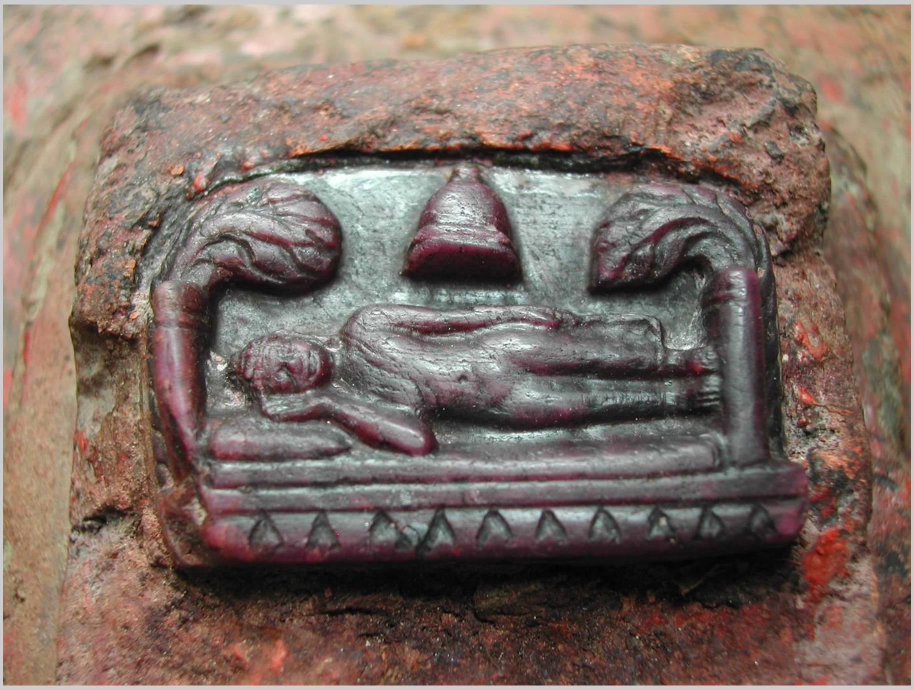
Antique Chinese Bronze Ming Buddha late 16th-17th century. The surface of the sculpture did not appear to have been previously cleaned or treated. I carried out some cleaning on corrosion products with a glass-bristle-brush. The sculpture was then degreased and cleaned with a solvent. A coating with a corrosion inhibitor was required as some of the corrosion products might have contained aggressive chlorides. To protect the surface from handling I thought it was prudent to coat the bronze with a microcrystalline wax and give it a light polish.



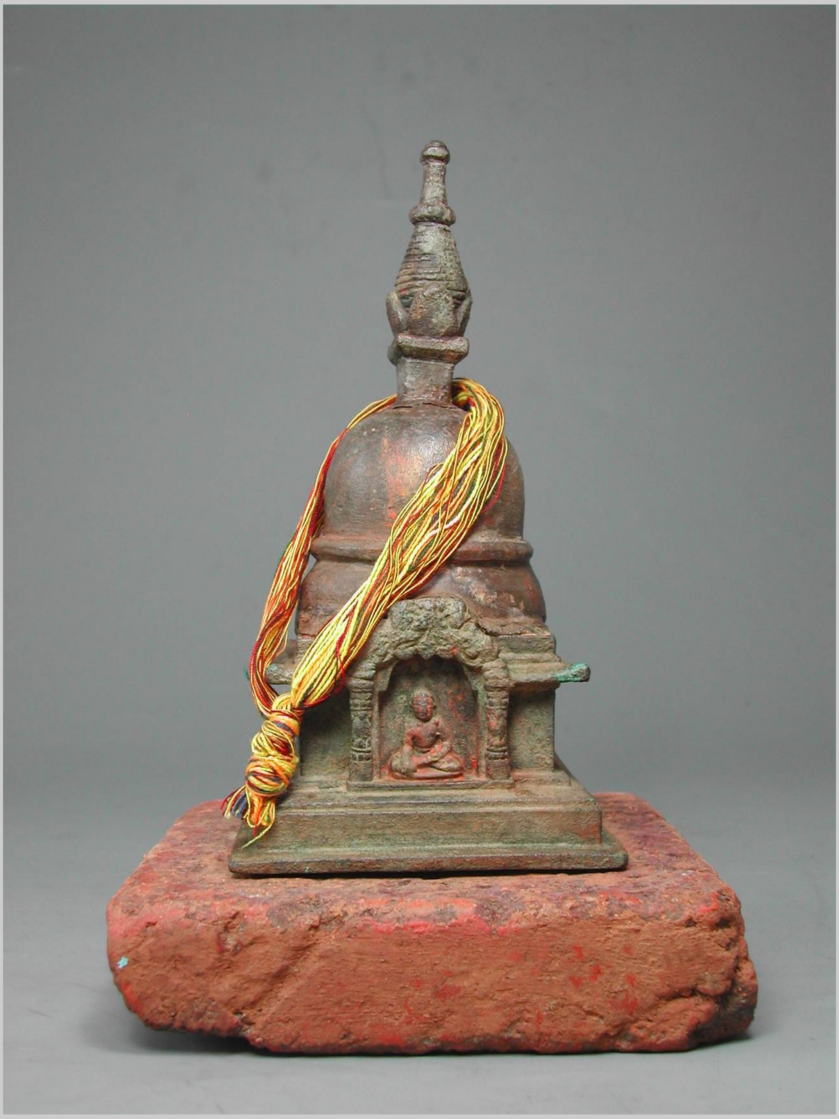


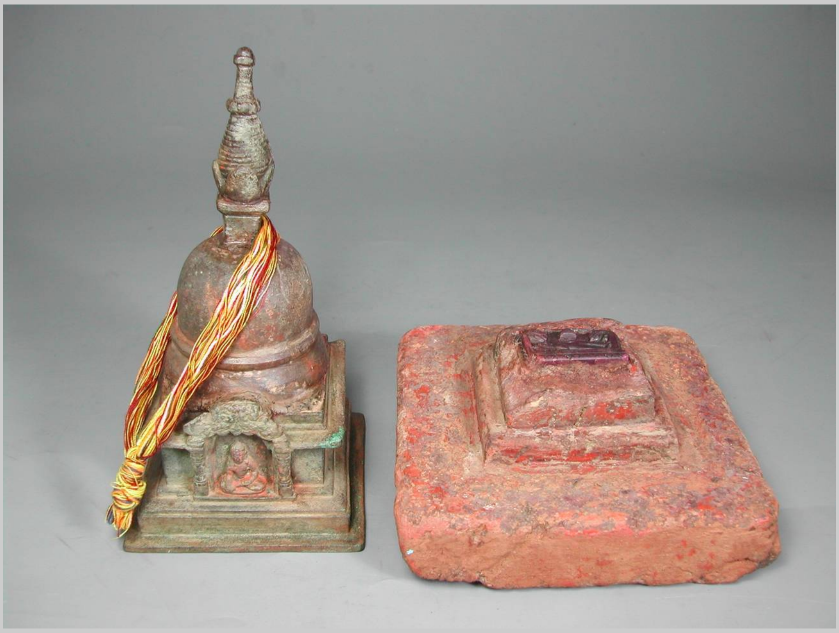
Indian bronze Stuppa on a terracotta tile, containing a gemstone seal, probably unpolished ruby.



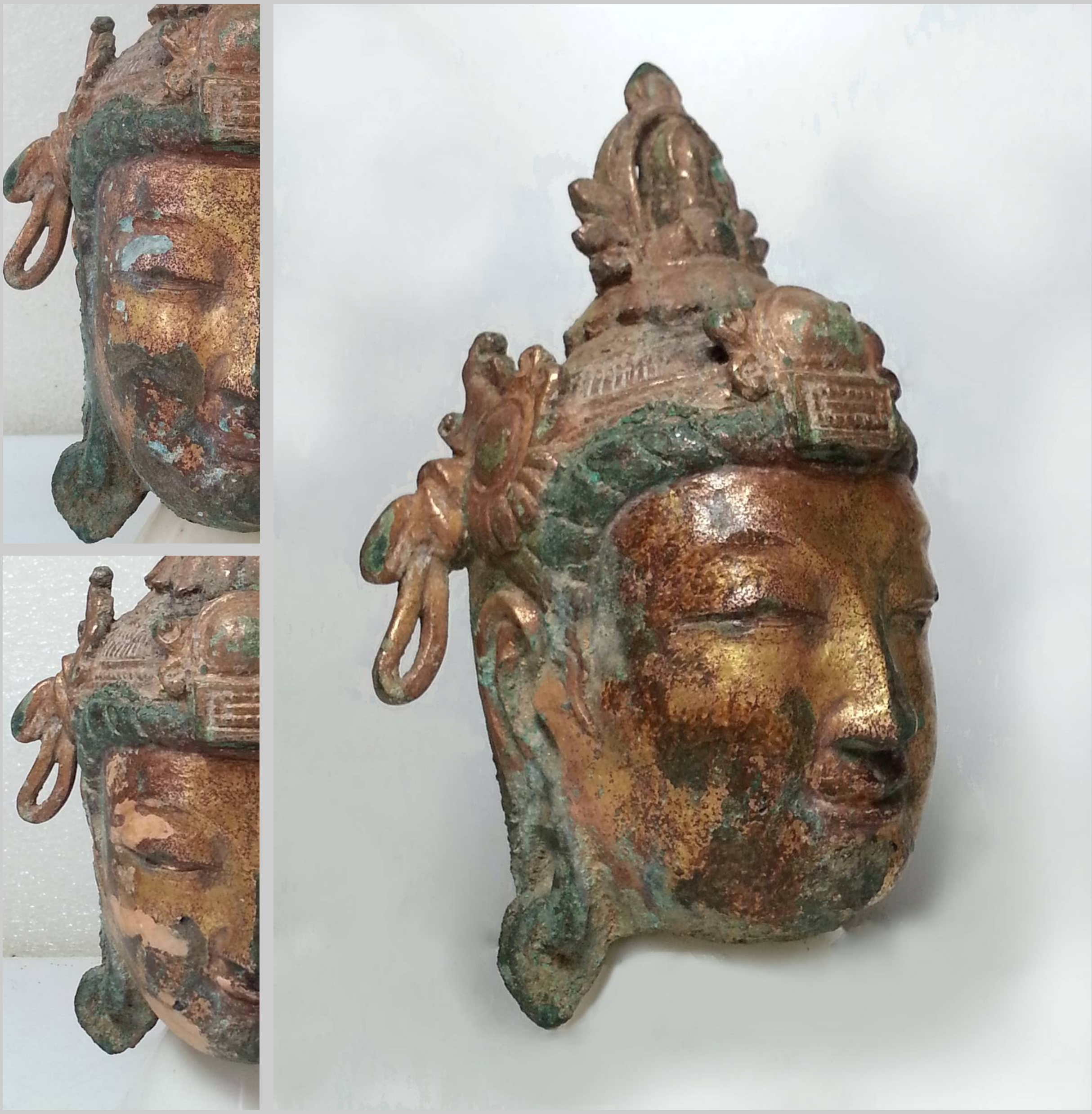


The bronze stupa was originally secured to the terracotta tile with a mixture of what appeared to be mud and cow dung. The stupa was lifted off by the owner, which exposed the seal. The mud was removed mechanically. The seal was cleaned with solvents, detergent and water.



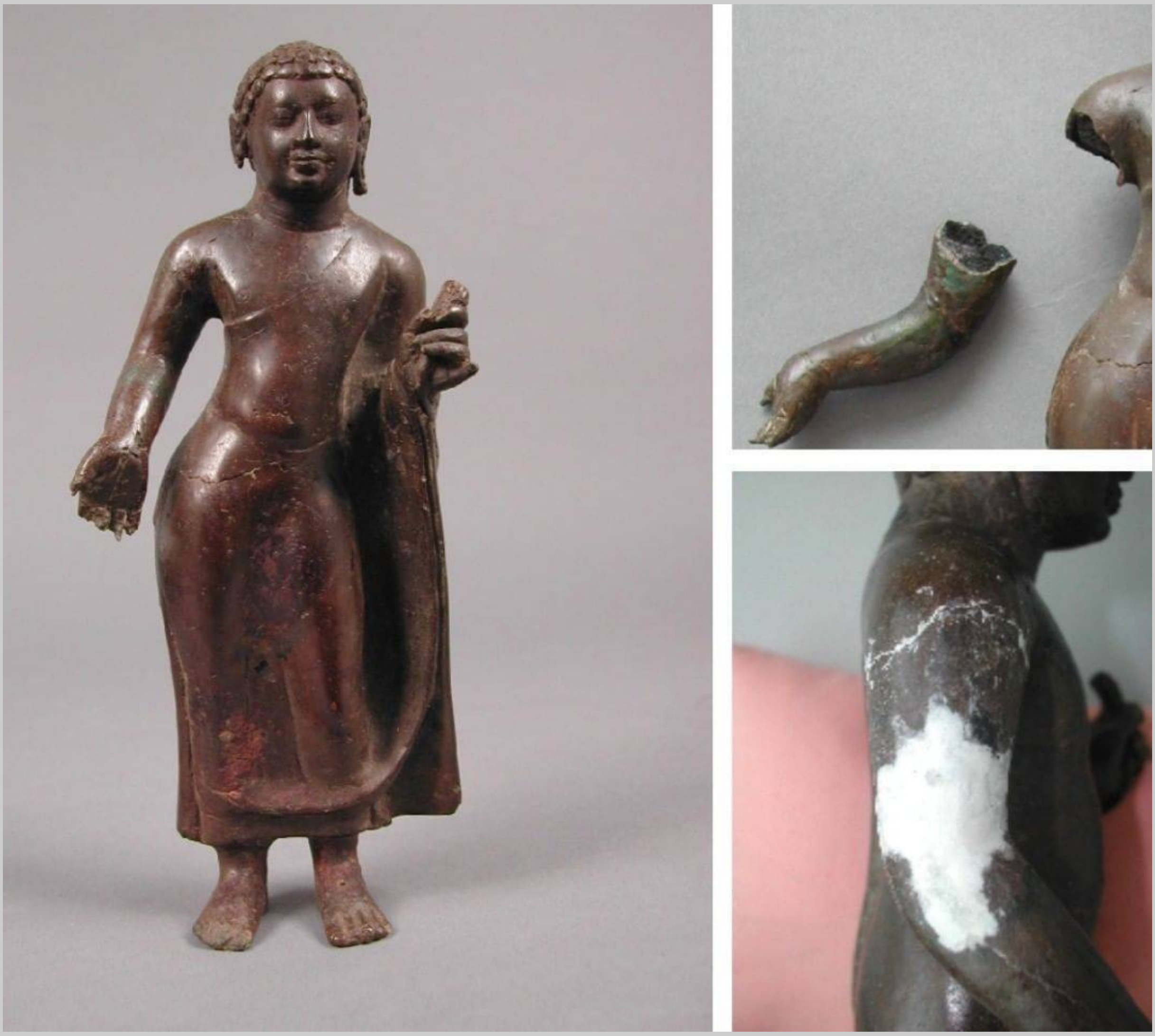


The stupa was mechanically cleaned, treated with a corrosion inhibitor and coated with a protective coating to prevent further oxidation. The owner wanted all the mud removed and no further work was carried out on the seal.

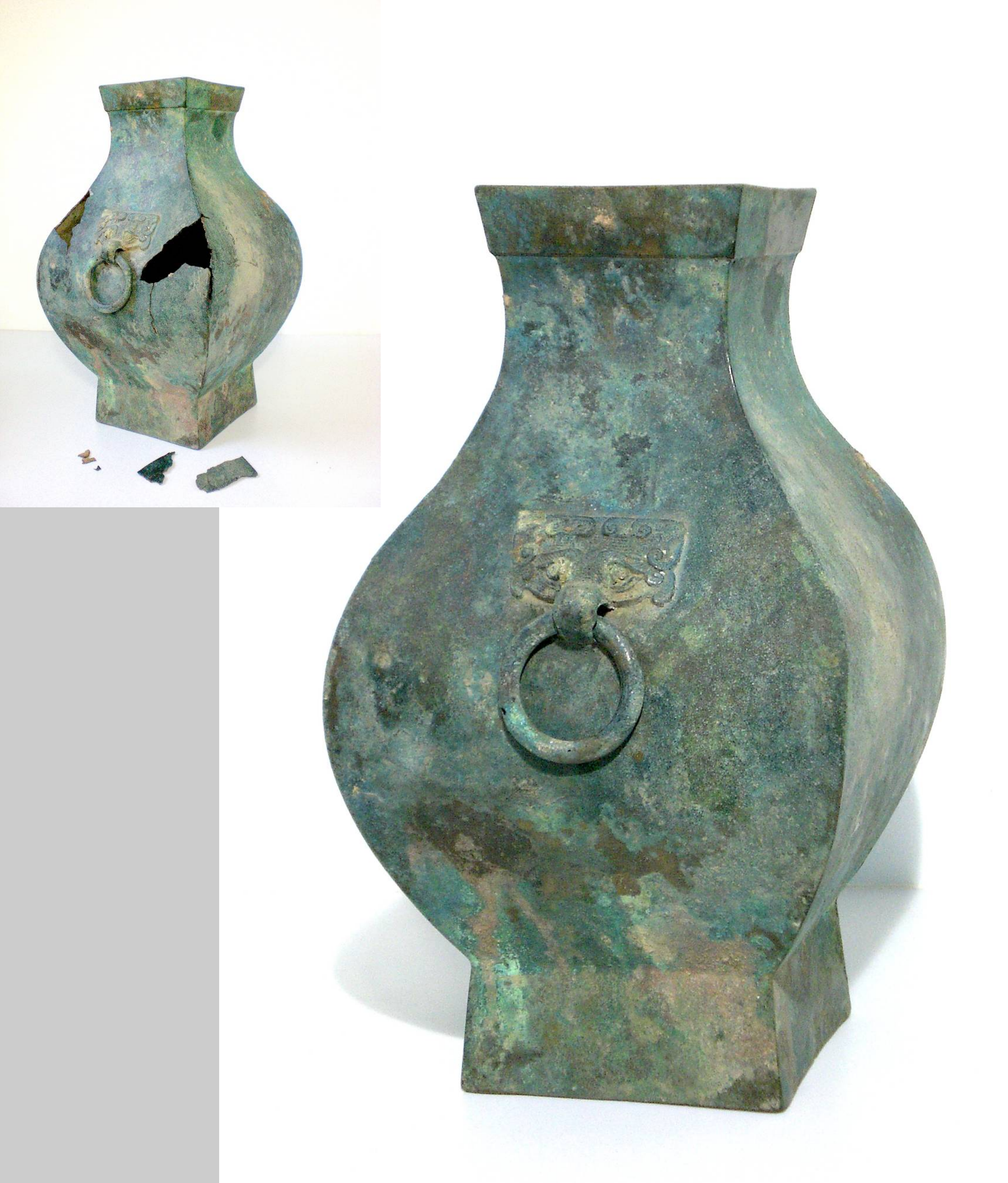


South-east Asian gilded bronze head. Parts of the head were heavily chloride corroded. The areas were stabilised, gap-filled and retouched.

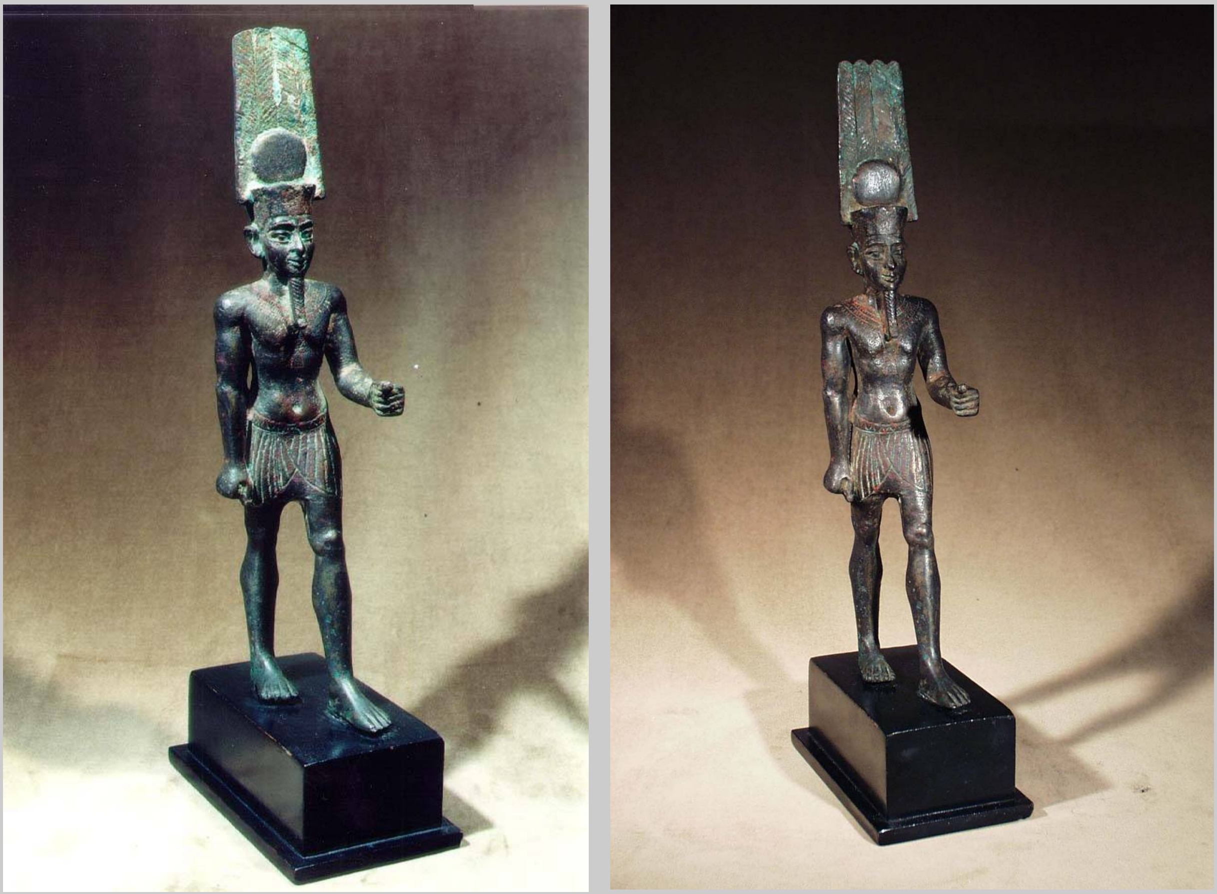
The treatment is mostly reversible. I did not replace the missing gilding, to prevent confusion with the original gilding. I have seen numerous instances where objects have been excessively re-gilded to make the artefact more tantalising and increase its value If this kind of deception is discovered, the piece would be rejected and devalued. In my opinion, it would then need to be cleaned and further treated to a more acceptable standard.



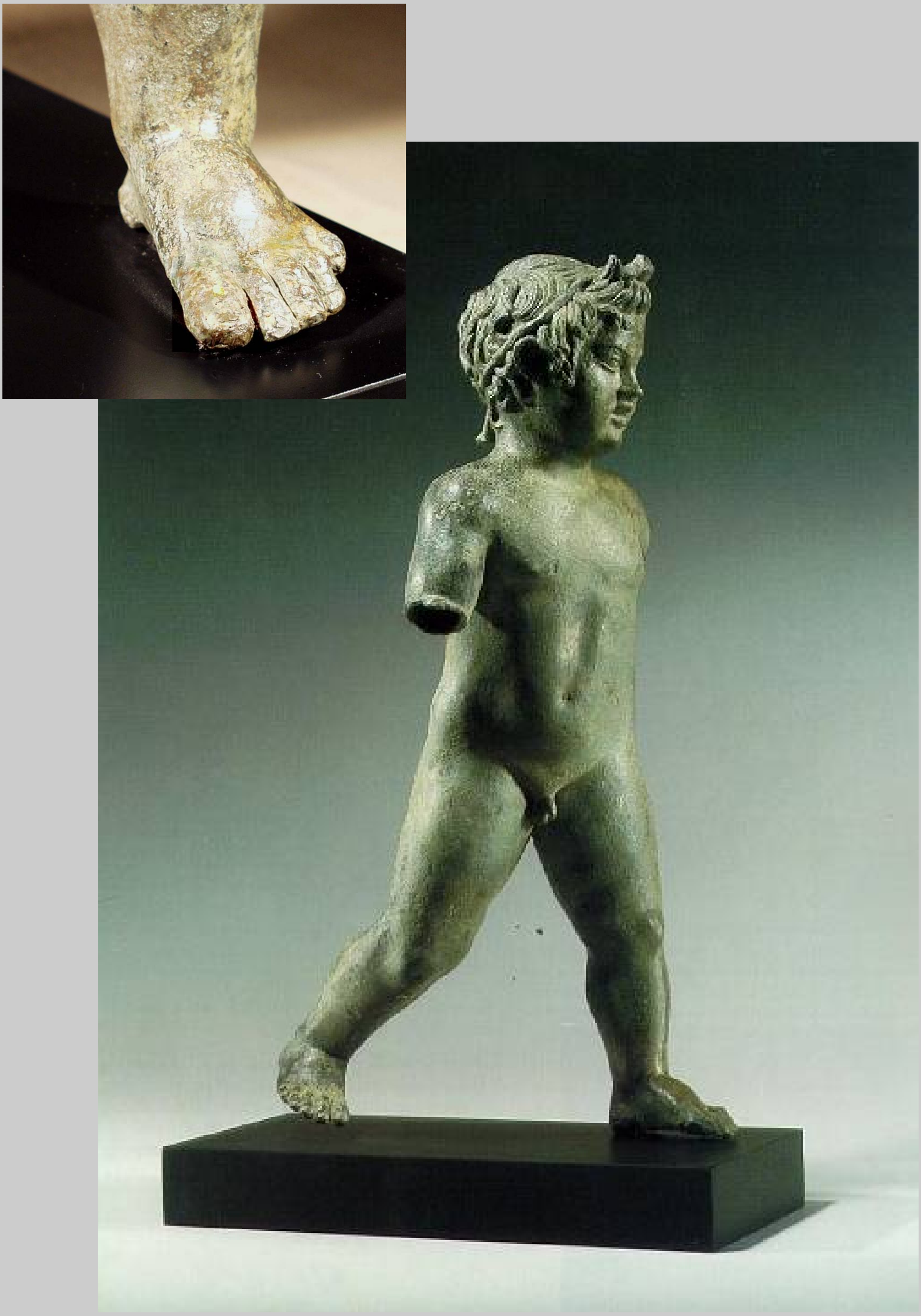
Standing Buddha, Bronze 5th – 9th Century Kedah, Malay Peninsula (Srivijaya) Asian Civilisations Museum, Singapore. This ancient bronze Buddha was made using the lost wax casting technique and needed conservation. It is one of the earliest standing bronze Buddha's from South East Asia. Due to the mineralisation of the bronze, the proper right arm was fractured in several places. The fragments were attached with an adhesive, gap-filled with a calcium carbonate filler and colour matched using acrylic colours. The treatment applied is completely reversible, since all the materials are soluble in appropriate solvents.



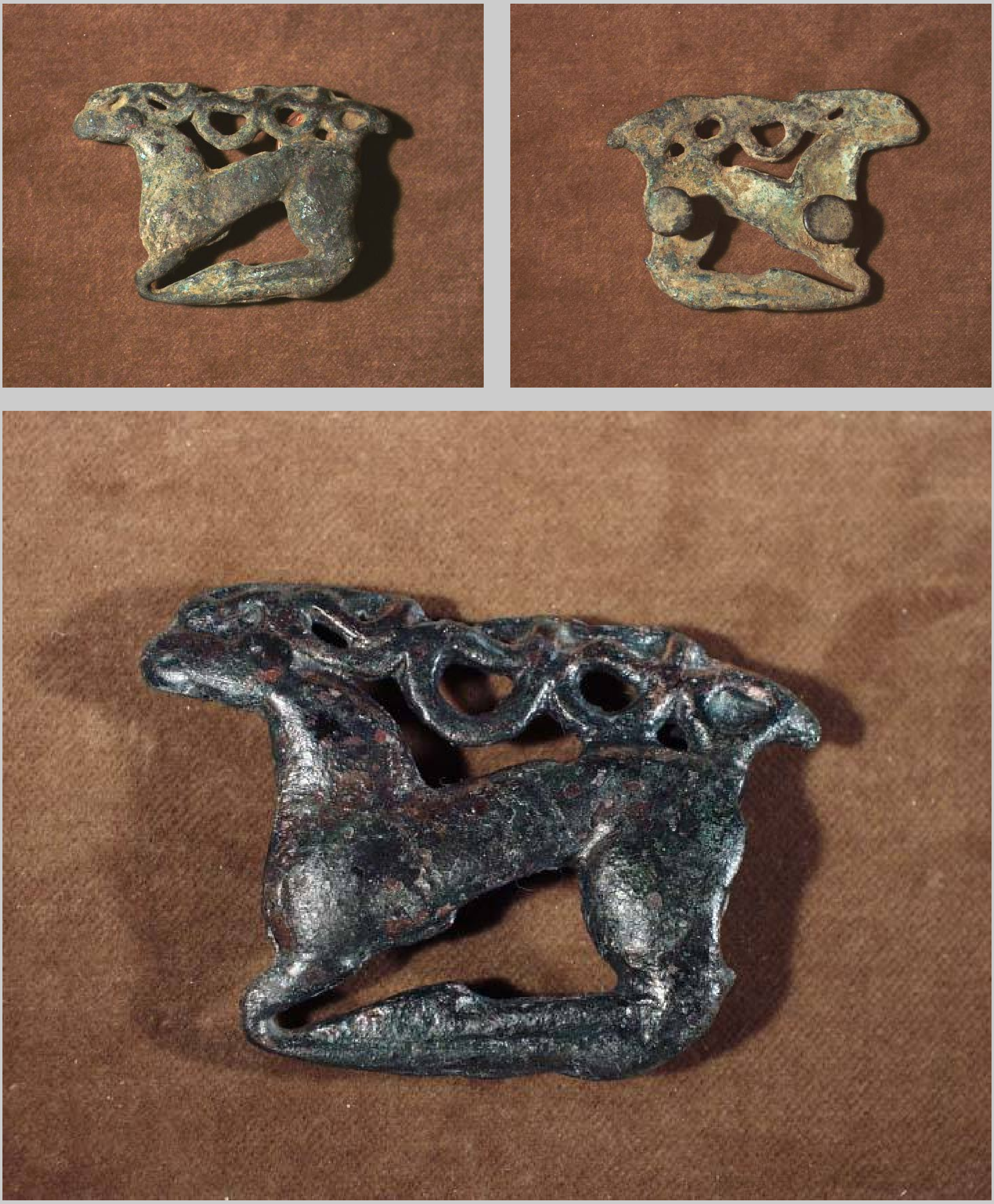
This Han Dynasty Bronze Fang Hu was broken during transport. The fractures showed that the metal was extensively mineralised. The fragments were re-attached with a two component adhesive. Since most of the fragments were present, there was not much filling to do. The hairline cracks were filled with a synthetic filler and the fills colour matched with the patina using acrylic colours.



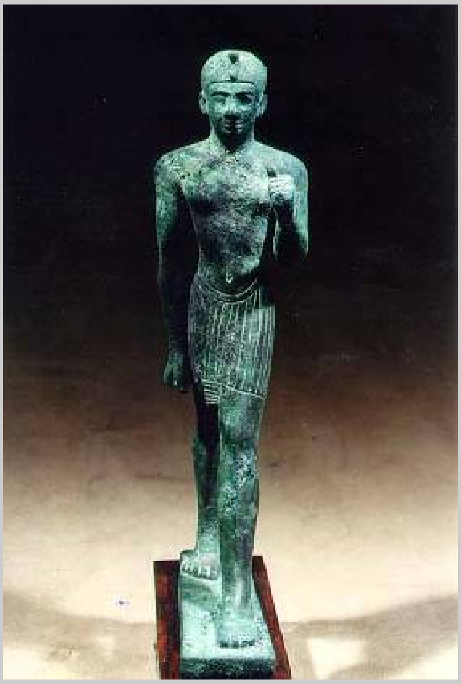
Egyptian copper alloy Kushite statue of Amun-Re circa 680 and circa 640 BC (Late Period). The surface was partially corroded and needed to be cleaned and stabilised. The corrosion was removed mechanically to the perceived “original surface” visible under a microscope when reaching the original tool-marks.

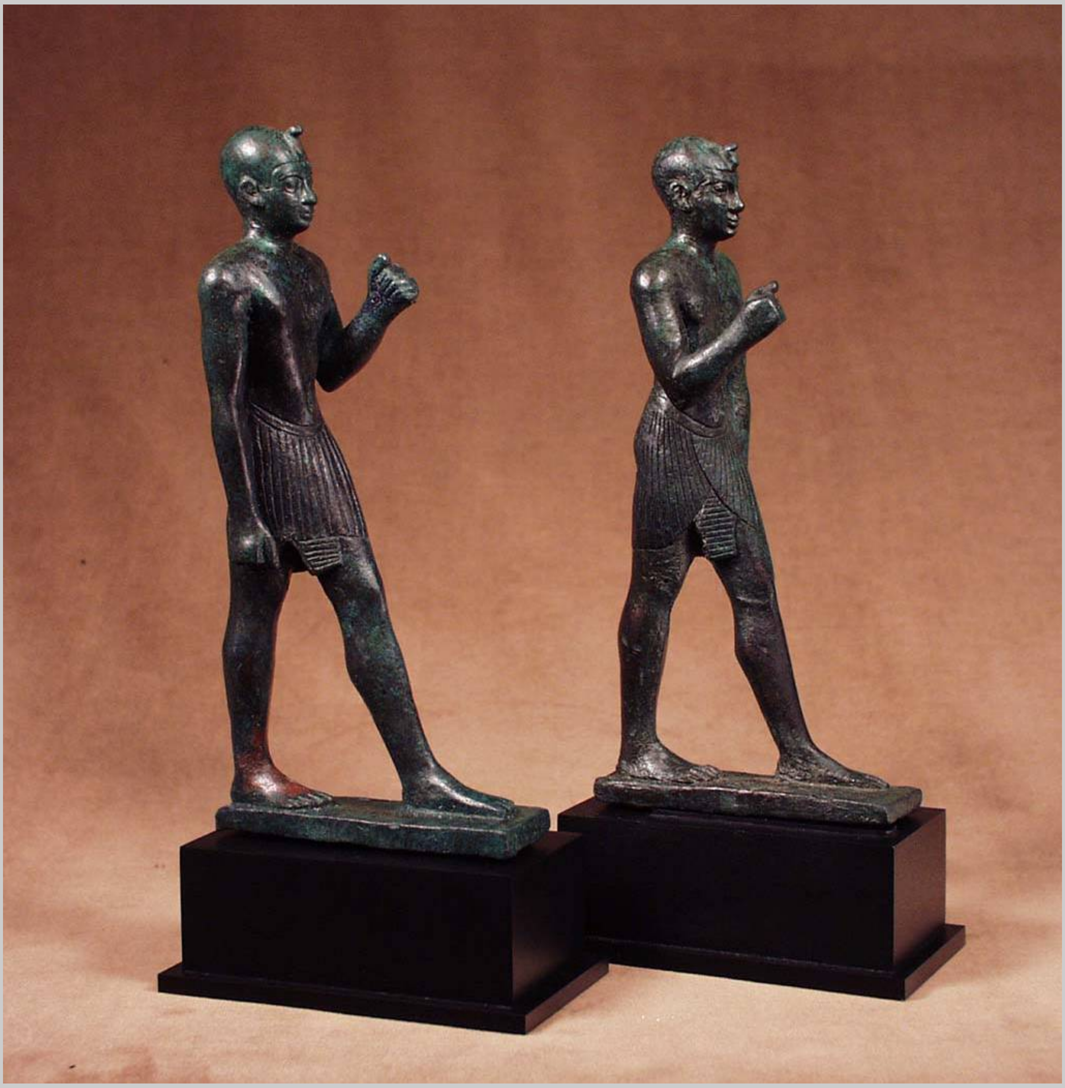


A Bronze Figure of a Boy, Rom. Imperial circa late 1st Century B.C.E. to 1st Century A.D., stepping forward to the left, his expressive face with an open mouth.(52. 4 cm). The left foot was missing its large toe and there was a hole in the middle of the foot just above the toes. The hole was filled with two component polymer and coloured with acrylic paint and waxed. The toe was modelled in polymer resin and coloured with acrylic paint and waxed. When the foot is viewed from the underside, it is obvious that the toe is new.

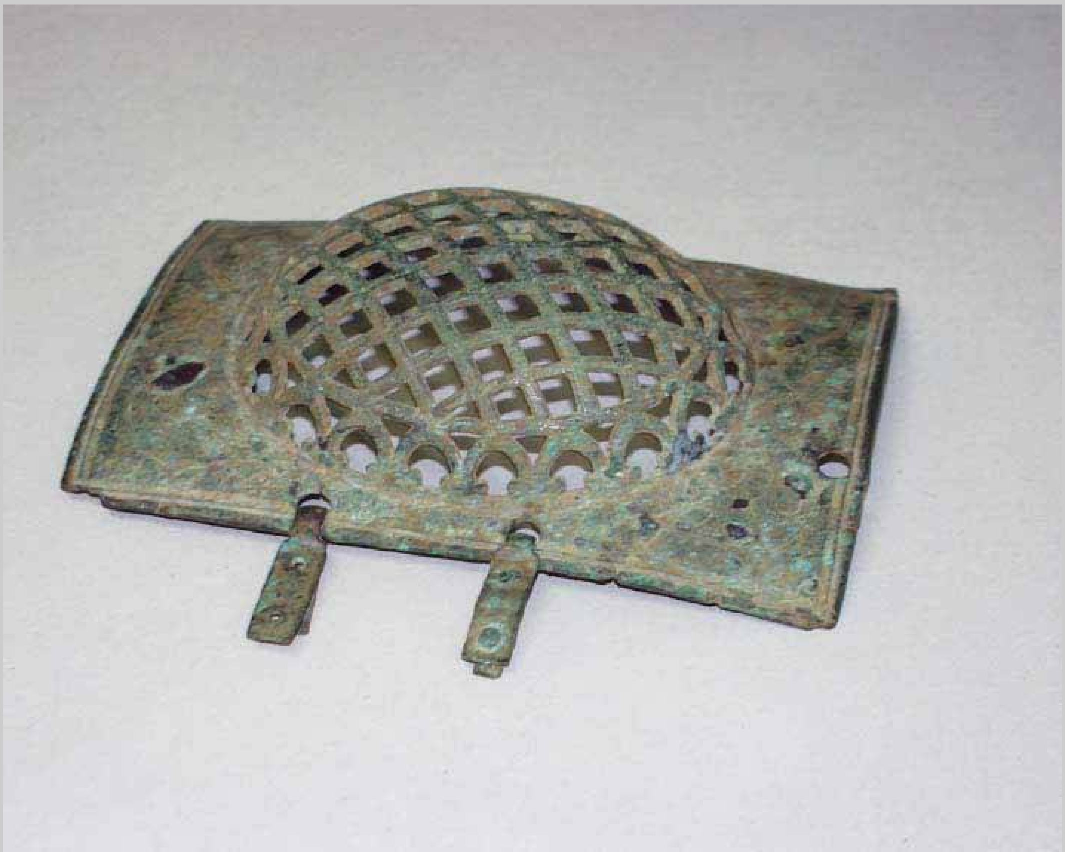


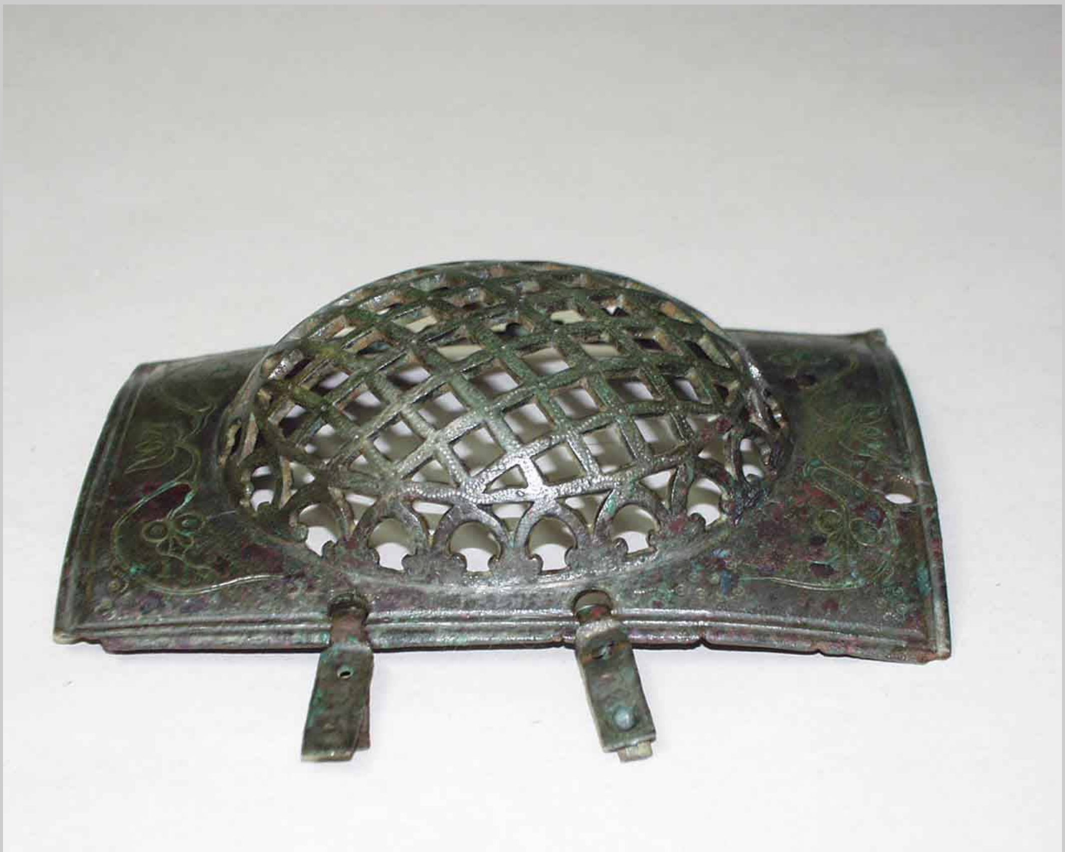
Copper alloy Deer Buckle. The surface was still covered in corrosion and soil. Using a scalpel and a microscope the loose corrosion was removed down to the level of the original surface where the original tool-marks were visible. The object was then given a protective coating of microcrystalline wax.



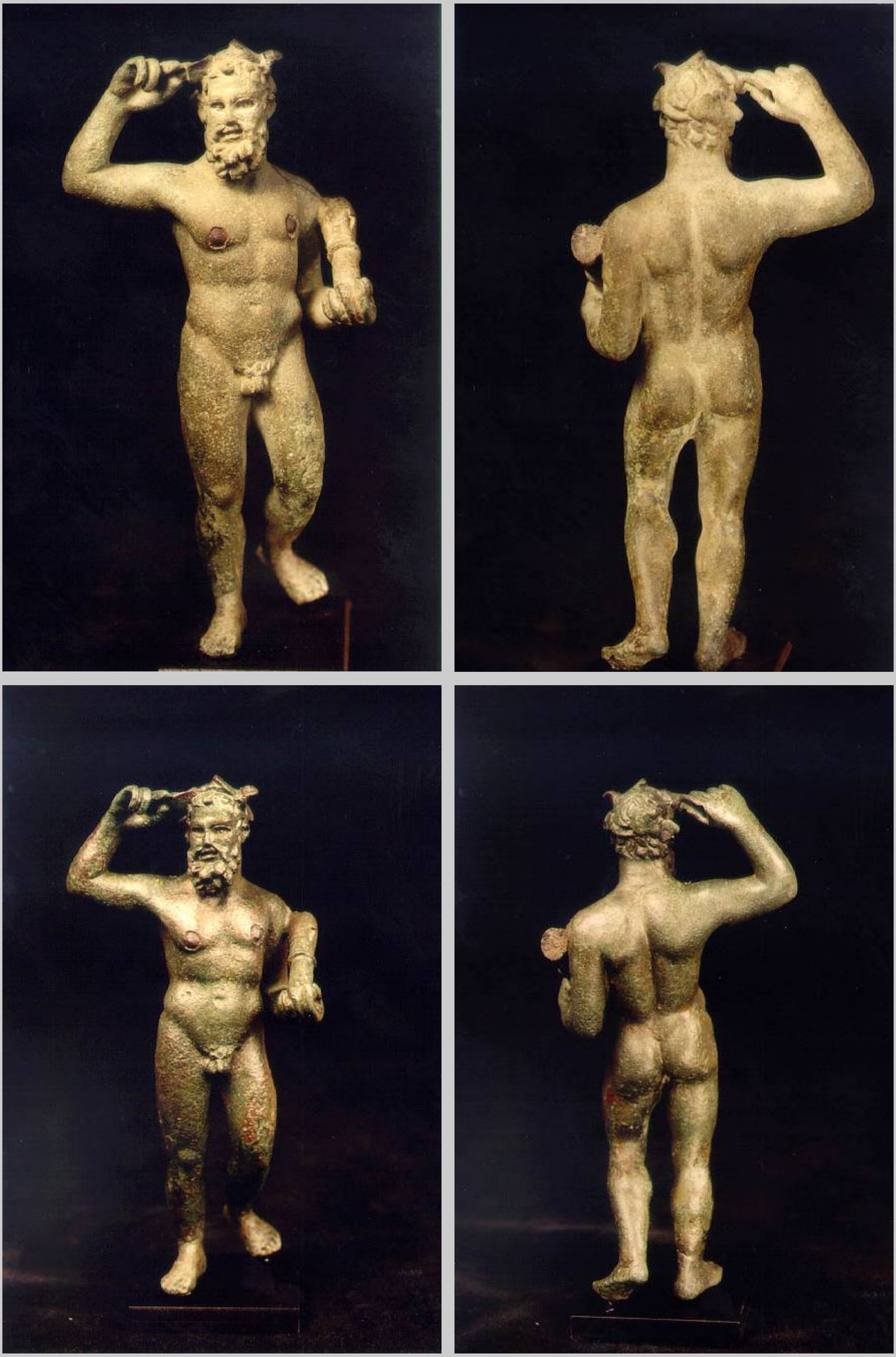


Egyptian bronze statue of a striding Kushite wearing a close-fitting cap with uraeus and a shendyt-kilt. Extremely fine style with a rich green patina. Rare, XXVth Dynasty, 715-664 BCE (19.7 cm tall) The surface was cleaned with a scalpel and glass-bristle-brush. Acrylic lacquer was used to seal the surface. The Azurite crystals were not removed. There was a large area of Azurite on the base of the figure (part of a pair).

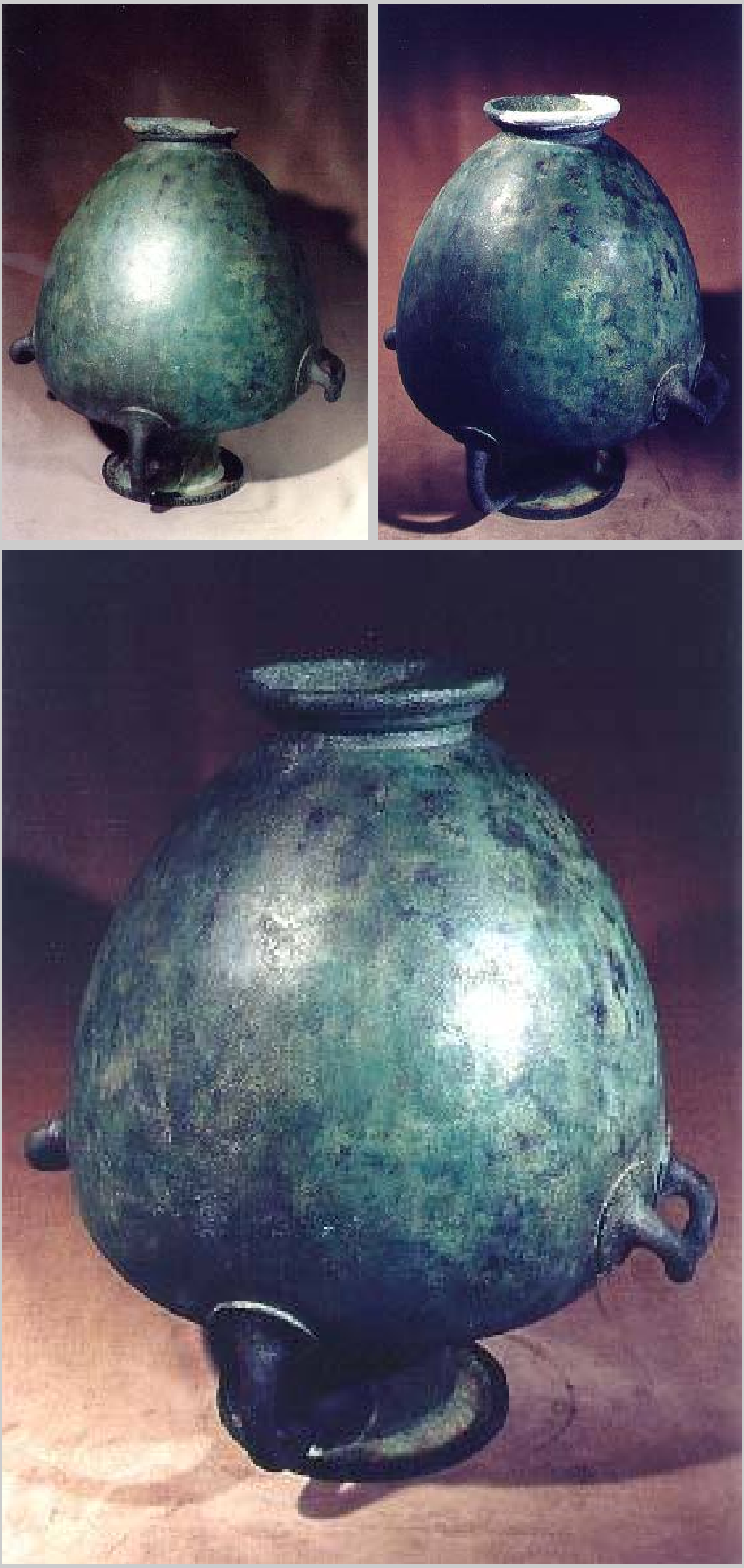




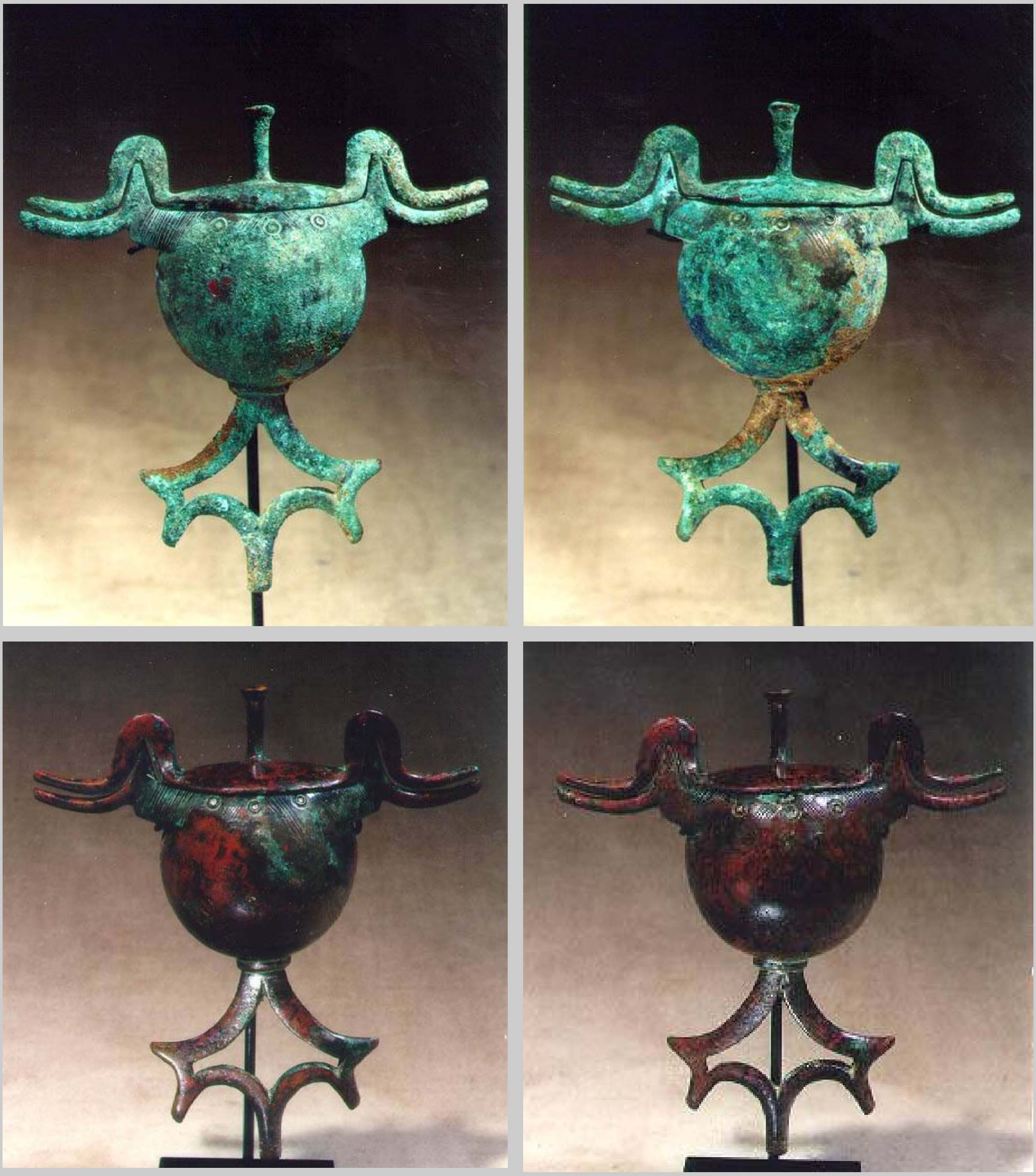
Copper alloy Roman eye-guard. The surface had to be cleaned and protected. The deposits were mechanically removed with a scalpel and microscope. The surface was then coated with an acrylic lacquer in a solvent solution.



Hellenistic bronze nude Herakles, Ca. 1st Century BCE. The surface was levelled by a previous restoration, leaving a very scratched surface structure. I gently planed the surface using a scalpel and glass-bristle-brush. This was considered viable since no original surface was remaining after the first restoration and the heavy chloride pitting corrosion. The final surface was then lacquered with an acrylic coating to prevent further corrosion.

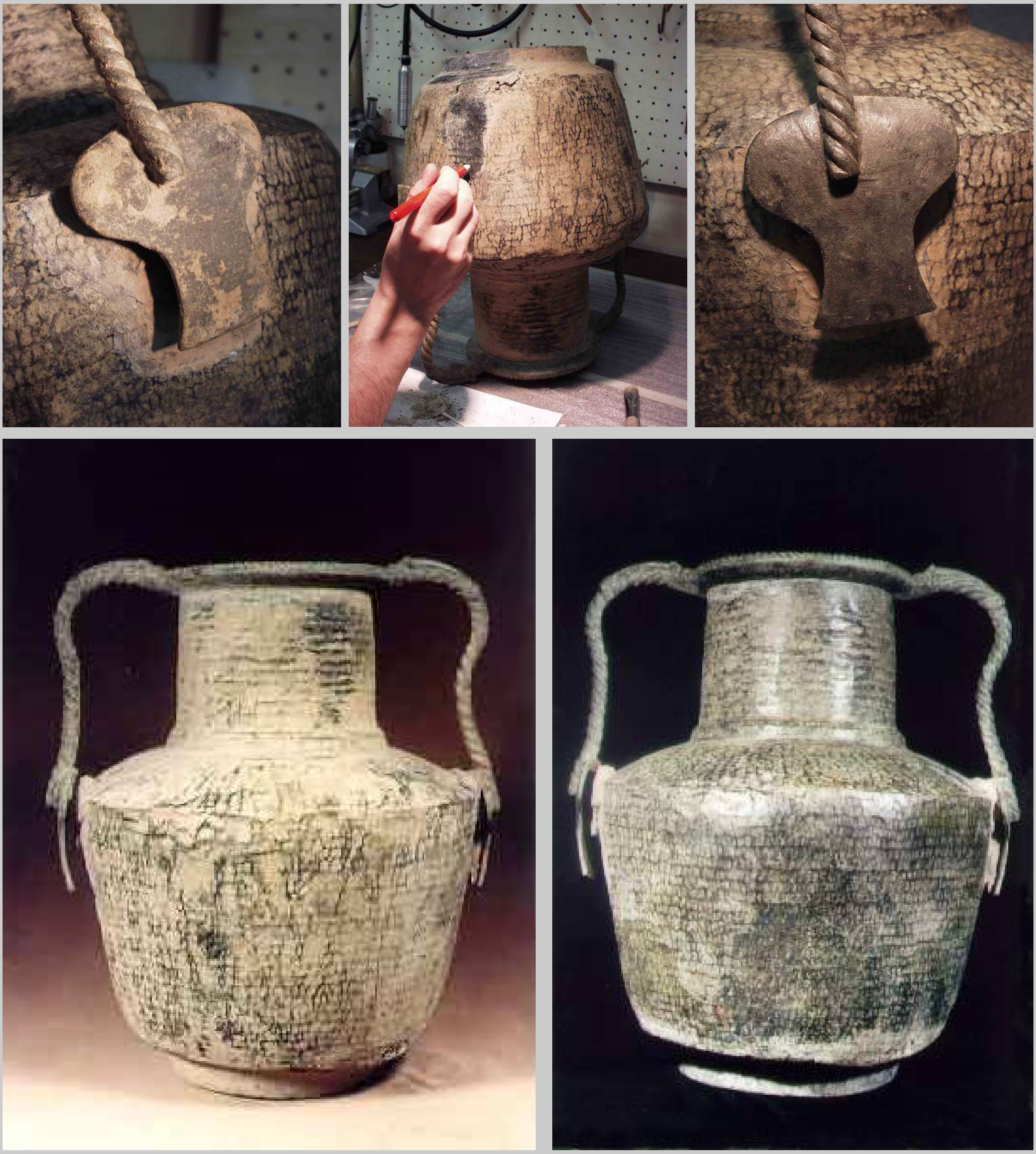


Greek Large Bronze Hydria, typical three-handled form with an egg-and-dart border on the rim and the foot, H: 40 cm. The body has been restored and partially re-patinated. Part of the foot was missing and needed to be restored with a polymer resin and colour matched with acrylic colour.

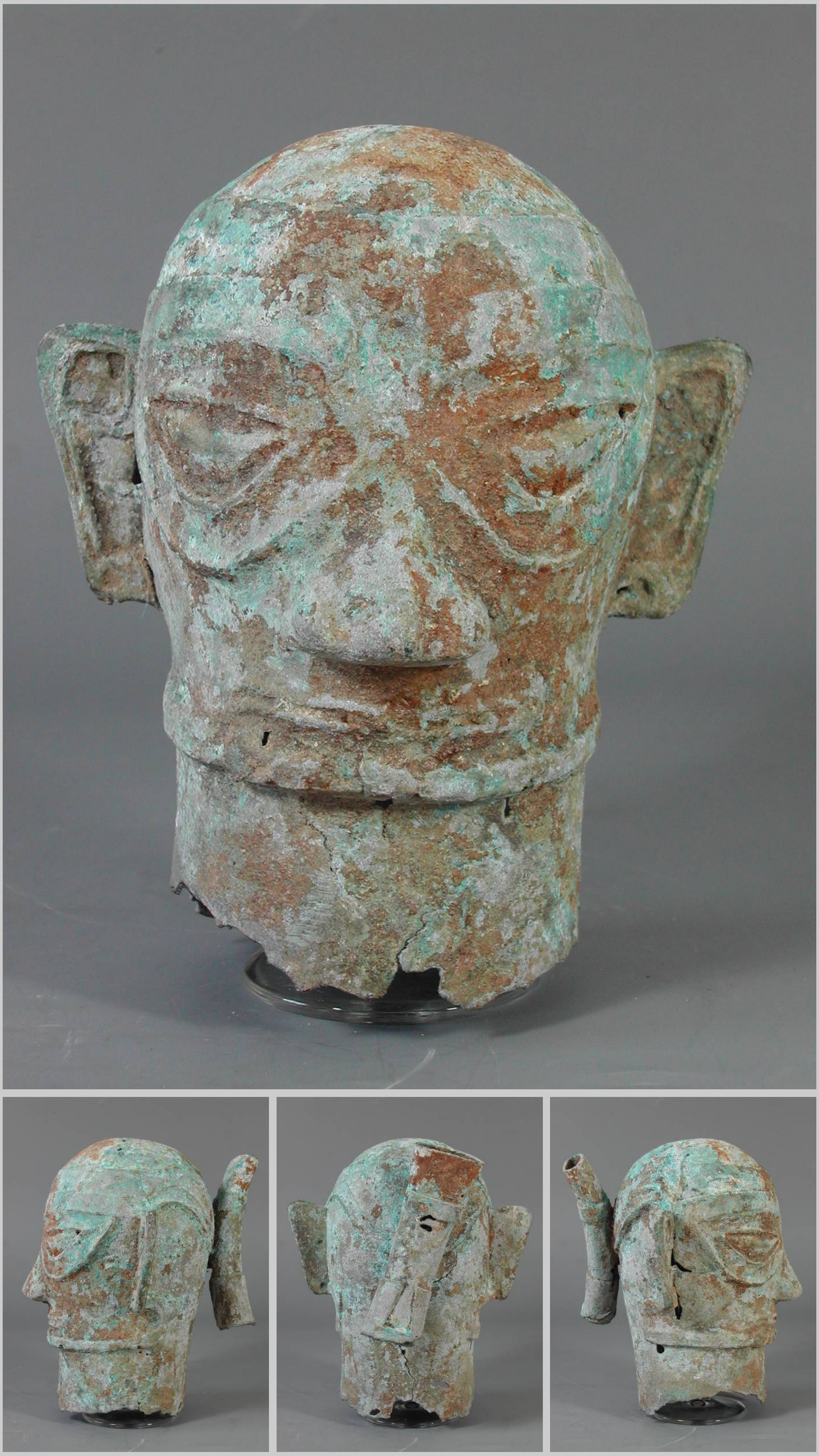


Ancient Greece, Geometric period, ca. 8th century BCE. A lidded pyxis with a flattened, globular body decorated with incised striations at the shoulder and a pair of abstract bird protomes at the rim.

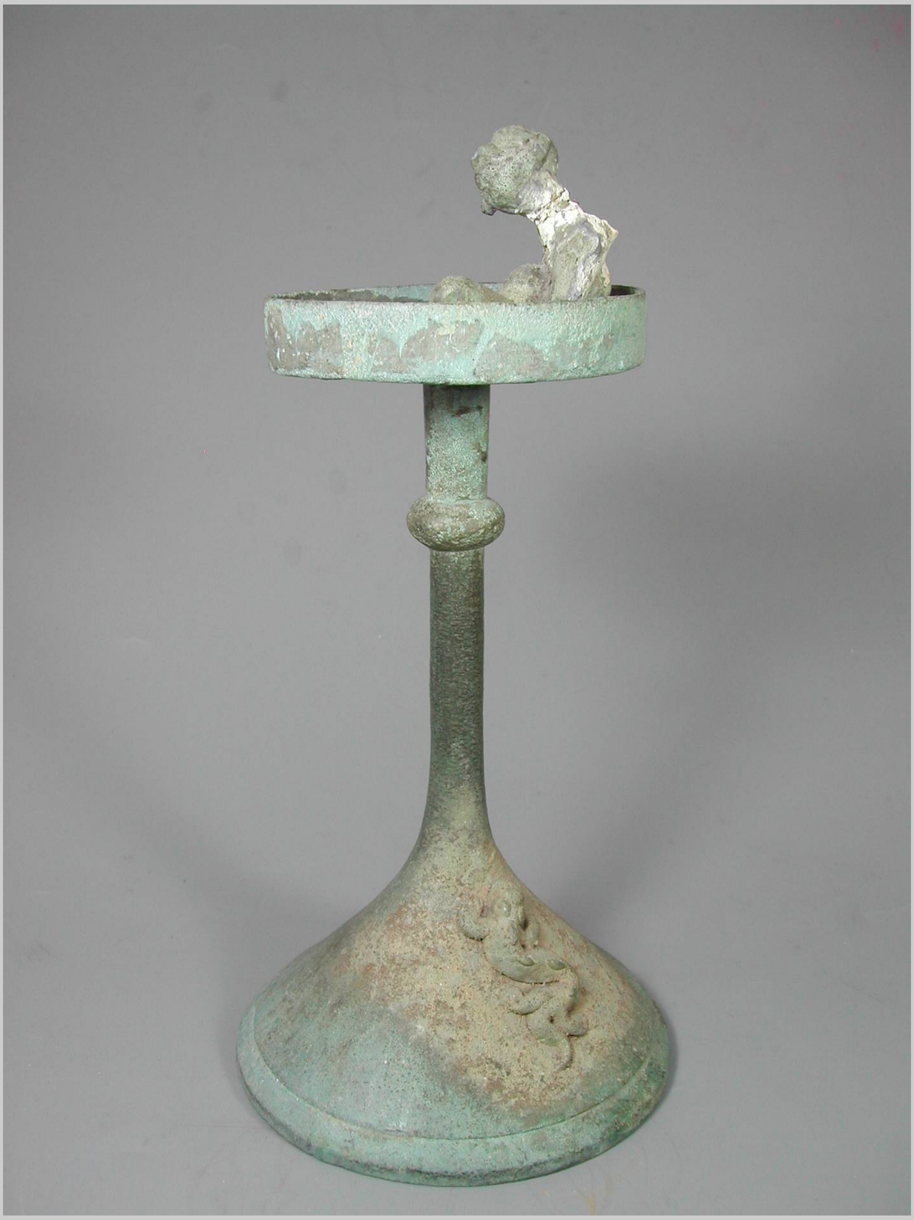
The surface had not been previously conserved. The copper corrosion covering the original surface disfigured the pyxis. The corrosion was removed with a scalpel, glass-bristle-brush under a microscope. This was followed with a microcrystalline wax coating to protect the surface from further corrosion.



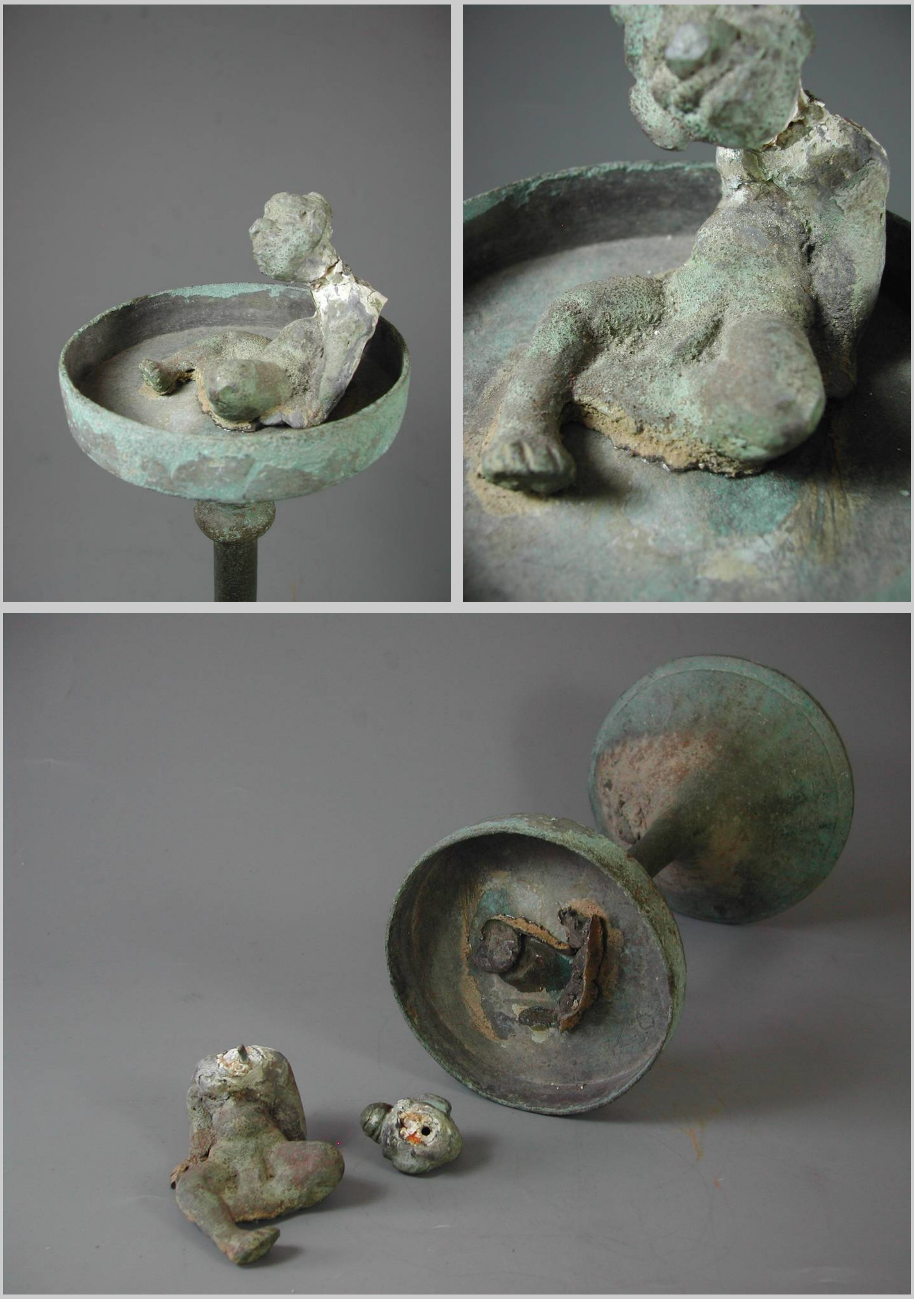
Late Roman or early Byzantine large copper alloy Amphora. Spirally-twisted handles terminating in leaf-shaped motifs 3rd-5th Century CE, height: 40cm.
The surface still had burial deposits and was manually cleaned with a scalpel and glass-bristle-brush. This was then followed by a micro-crystalline wax coating to protect from future corrosion.



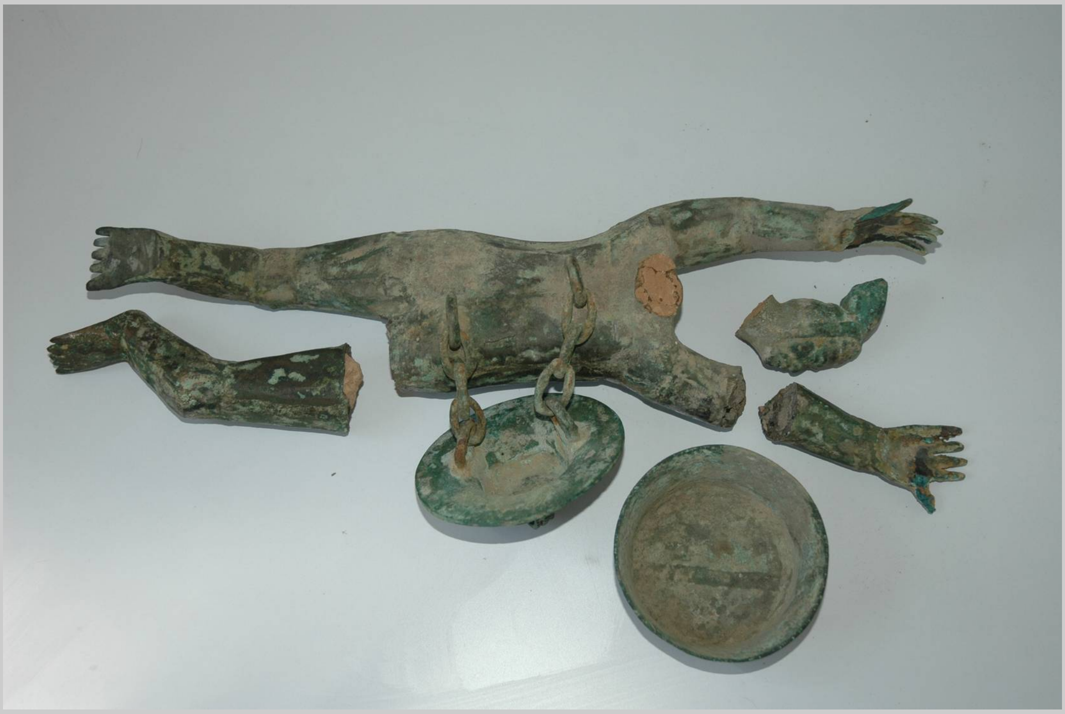
Shang dynasty (c. 1600–1046 BCE) Sanxingdui culture bronze head. It was not possible to sample and test the head. The surface was treated with a corrosion inhibitor. The corrosion layer was powdery and was stabilised with a solvent based polymer. During the treatment no ambiguities of its authenticity were obvious under magnification, however further metallurgical testing was recommended.

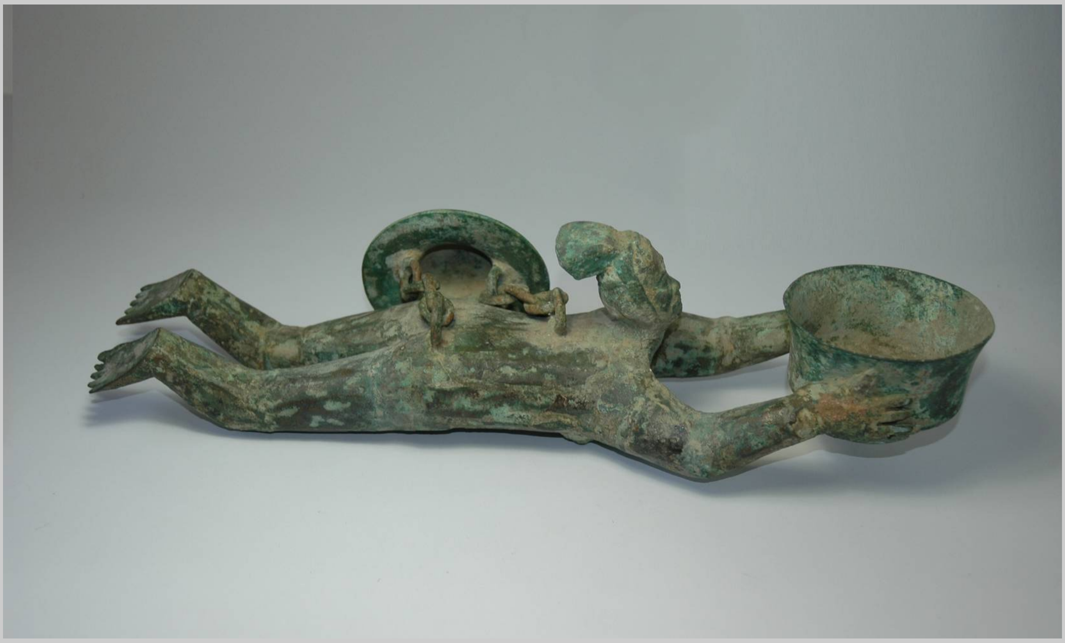


“Antique” Chinese bronze oil lamp. The dragon at the base was deliberately covered in sediment. The neck of the seated figure had previously broken and a white sediment was visible. The patina was rather even, and in general the artefact arose suspicion and, in my opinion, needed further investigation to determine if any of the material present was of ancient origin.

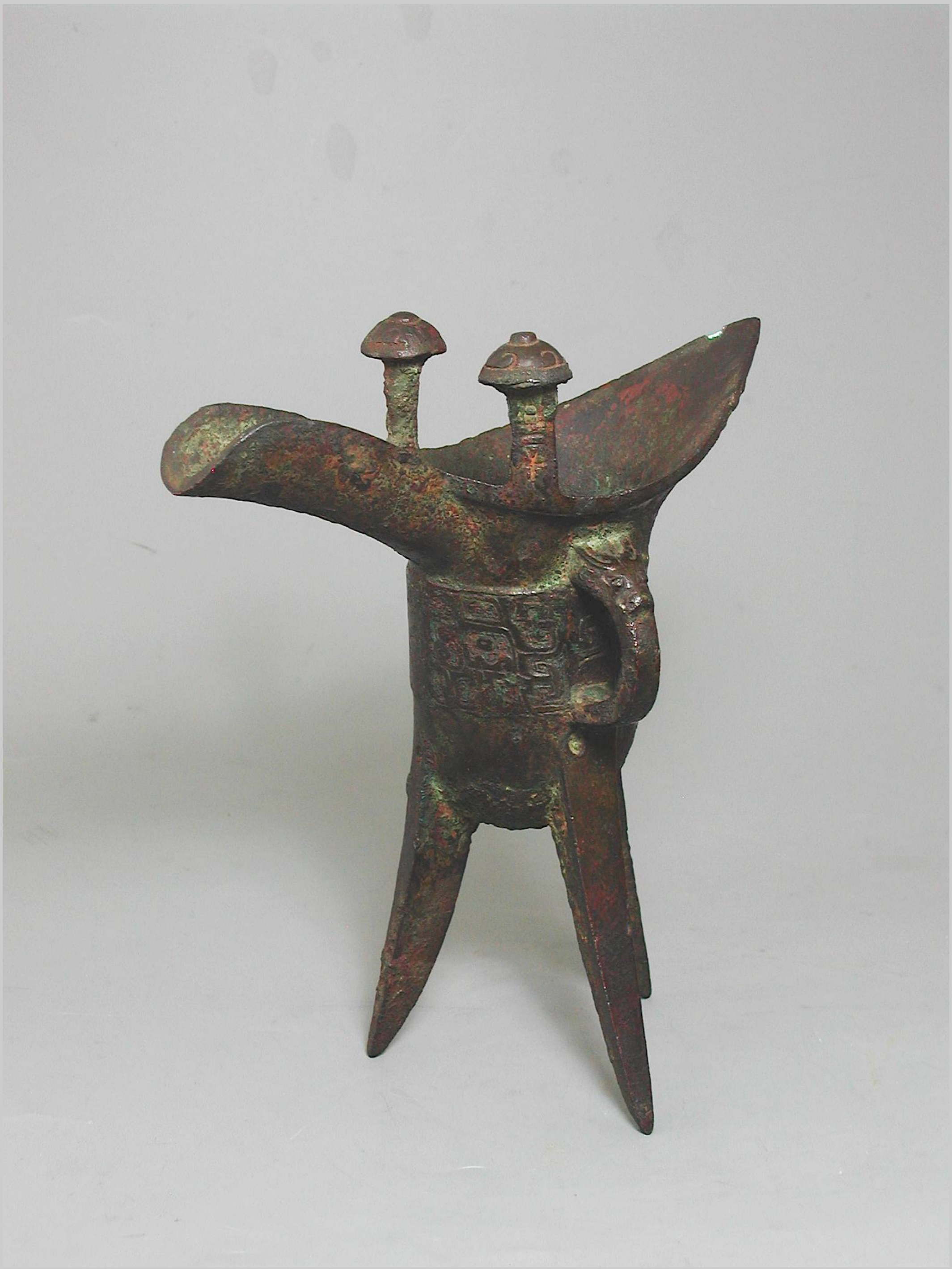


The neck of the figure was tested using various solvents and the head dislodged easily, displaying a pin that secured it to the body. After removing some of the light deposits on the base of the figure, I saw that the figure was glued to the base. Removing the figure revealed the extensive use of synthetic resin in its construction. At this point it was clear that the pastiche had no archaeological or historical merit and the testing was halted.

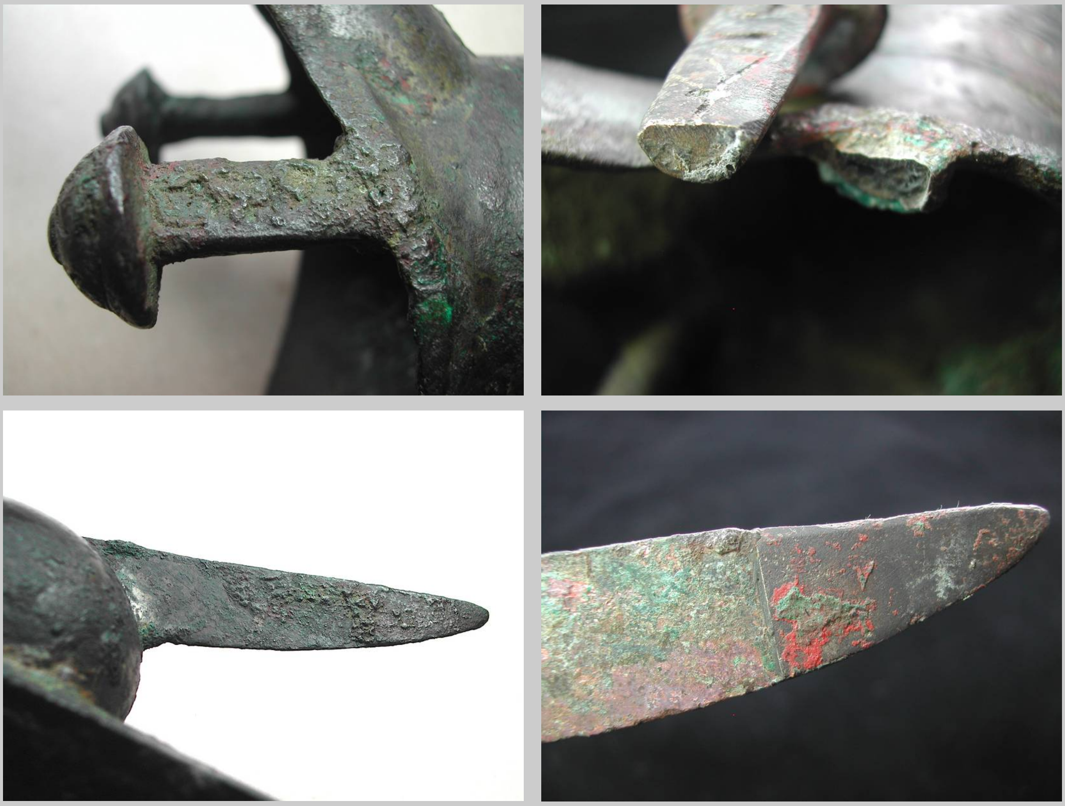




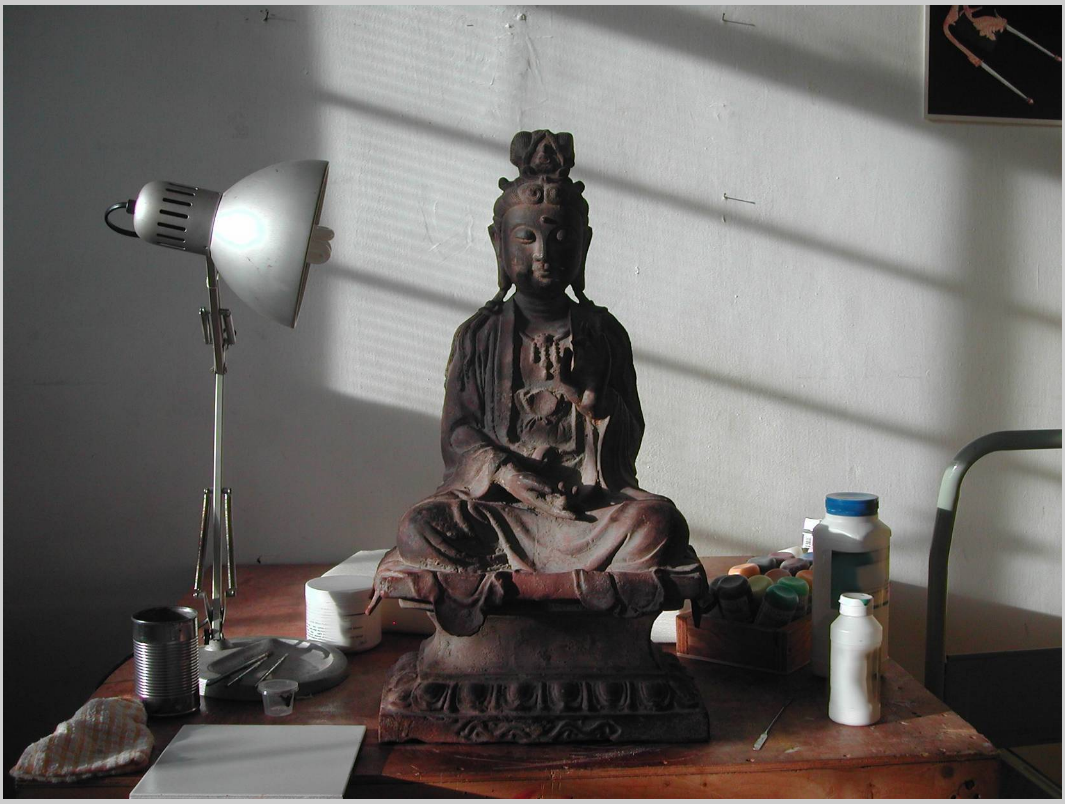
Antique Chinese copper alloy lamp fragmented in various areas. The fragments were re-attached with dowels and a synthetic resin. The gaps were filled with a carbonate filler and colour matched with acrylic paint.



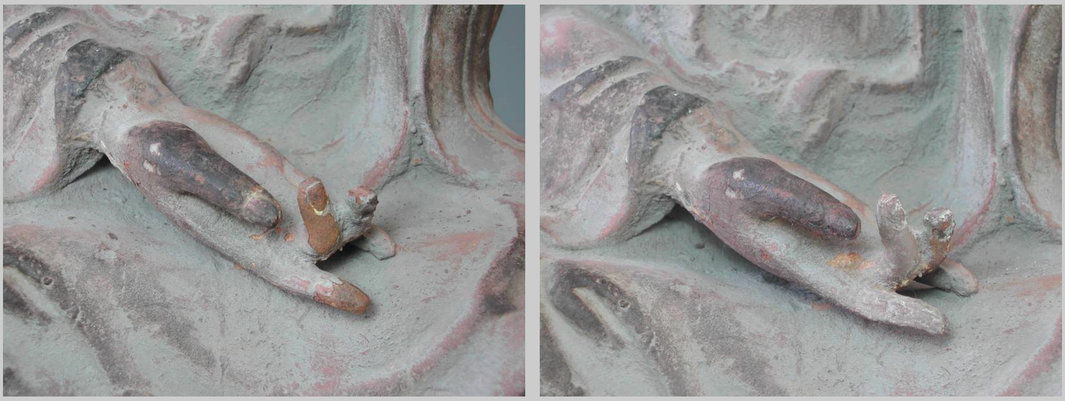
Chinese archaic copper alloy libation cup (Jue), Shang dynasty (ca. 1600–1046 B.C.E). The Jue was heavily corroded and needed cleaning. The original decoration had been partially removed from earlier restoration attempts, by other restorers, using grinding tools.



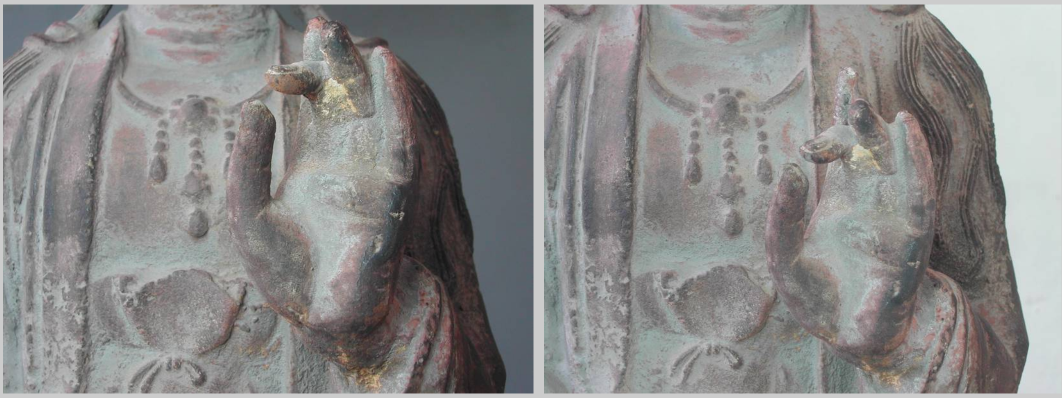
One of the pommels attached to the lip of the Jue, was covered in what appeared to be thick copper corrosion. The corrosion was removed with a scalpel under a microscope. I discovered that the pommel was added during the last restoration. The very flat adjoining surfaces of the fracture was a clear indicator. The same was the case with one of the legs. I then halted the restoration. This type of old restoration is very invasive and is hard to detect without an x-ray, MRI or actual cleaning of the surface by removing the deposits added.



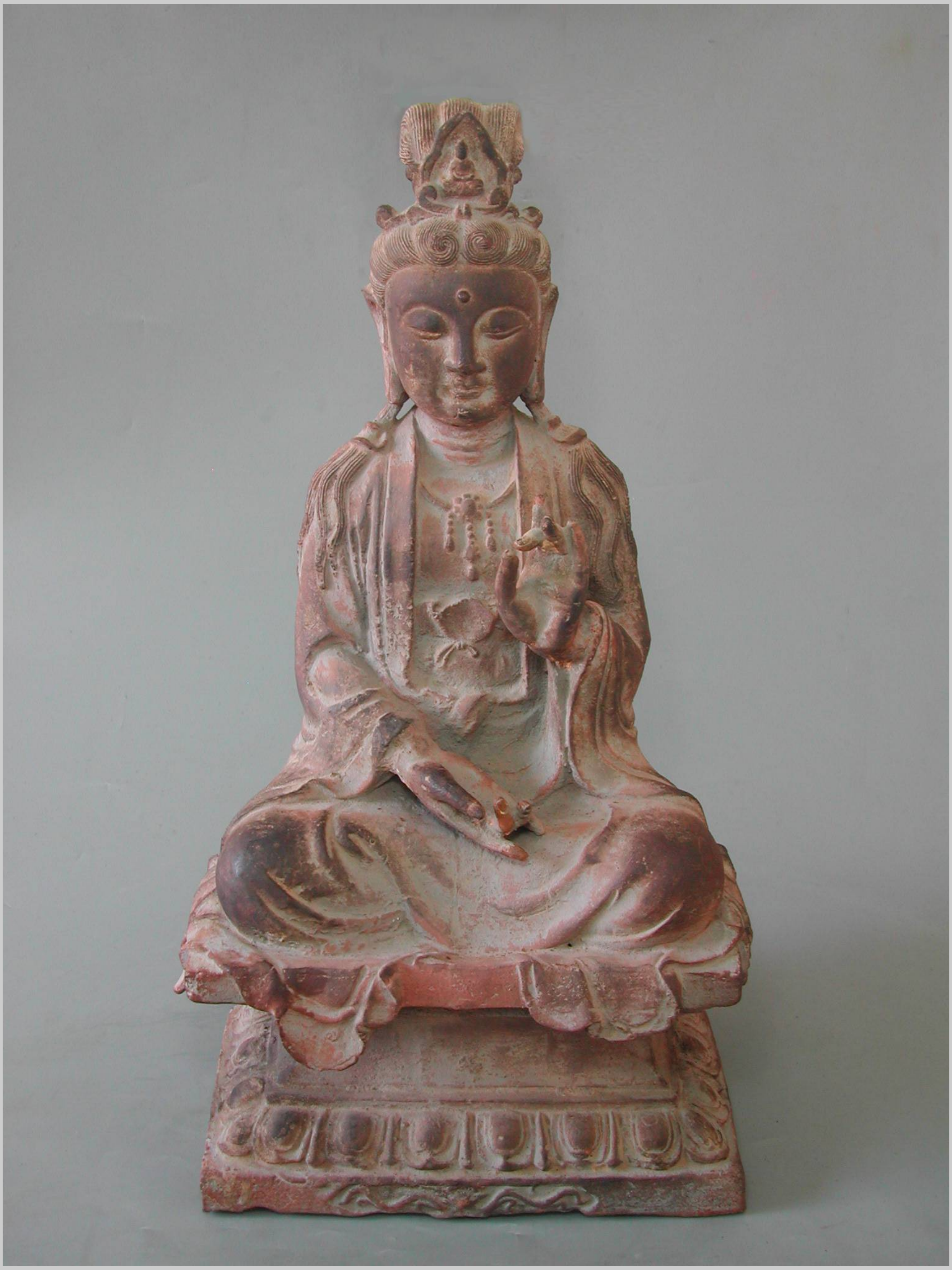
Guan Yin statue made of iron and coated in lacquer. Various areas contained a pigmented finish. The posture is Abhaya Mudra which means protection, reassurance, blessing. The lacquer is cracked, lifting and missing in various areas and needed stabilisation of the iron corrosion and consolidation of the lacquer.



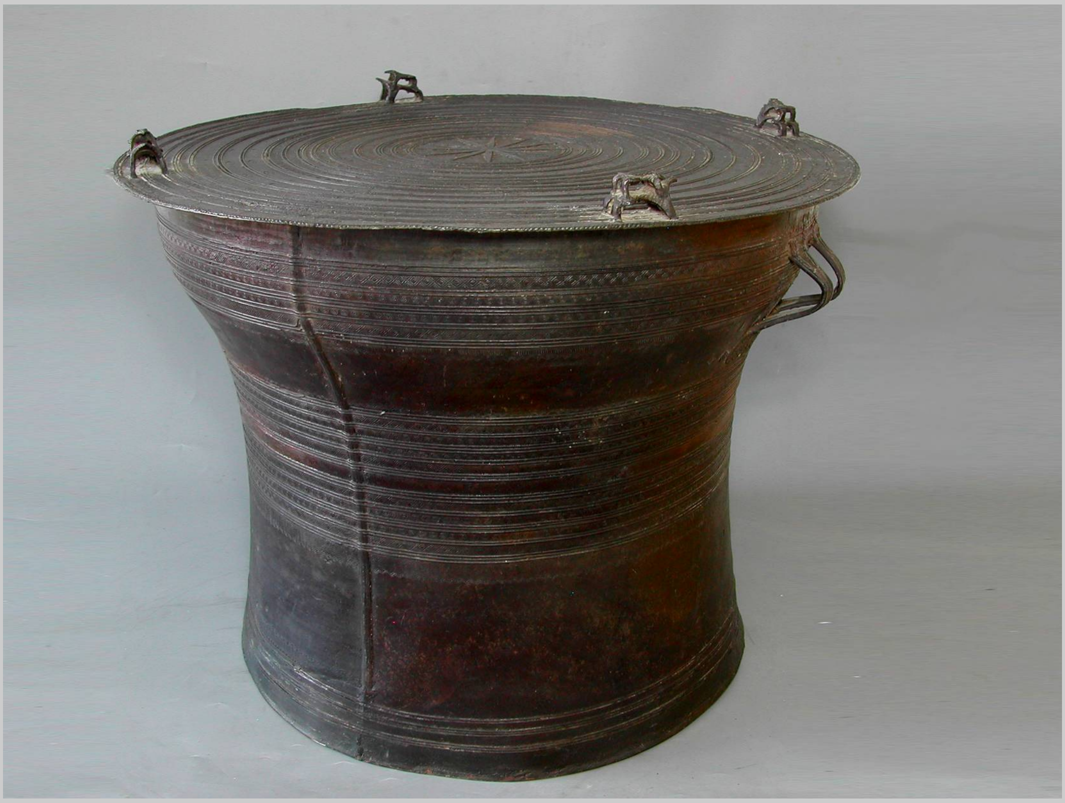
The proper right hand before treatment and after conservation-restoration. The powdery corrosion was removed and stabilised with a corrosion inhibitor. The frail edges of the lacquer was consolidated with a solvent based resin. The missing lacquer was replaced by a synthetic filler and coloured using acrylic paint. The treatment is almost completely reversible.

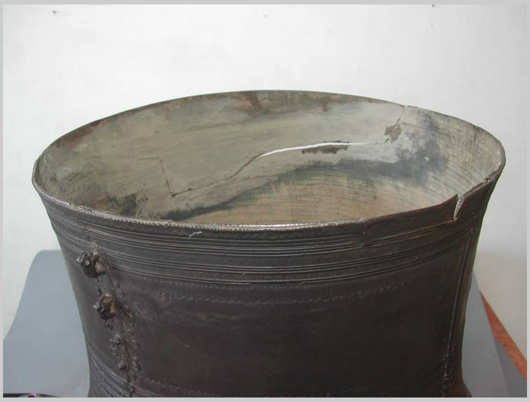


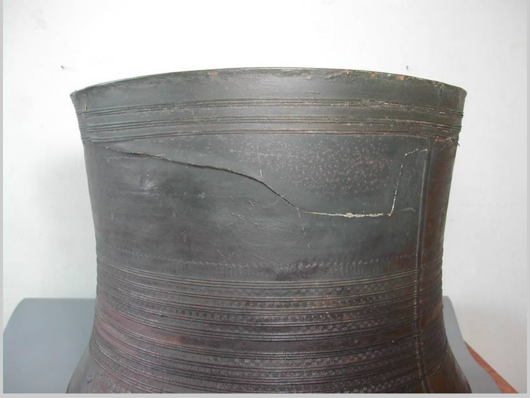
Proper left hand of the Guan Yin before and after corrosion inhibitor treatment, infilling and colouring.

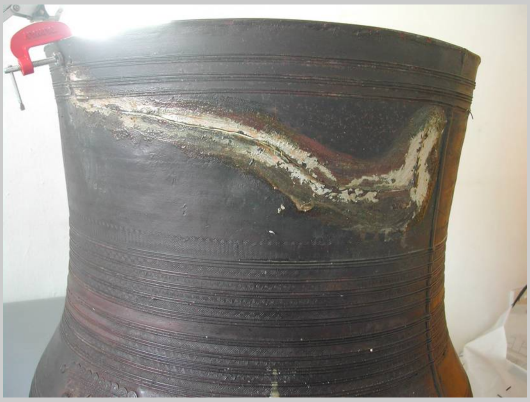


Guan Yin after conservation-restoration treatment.

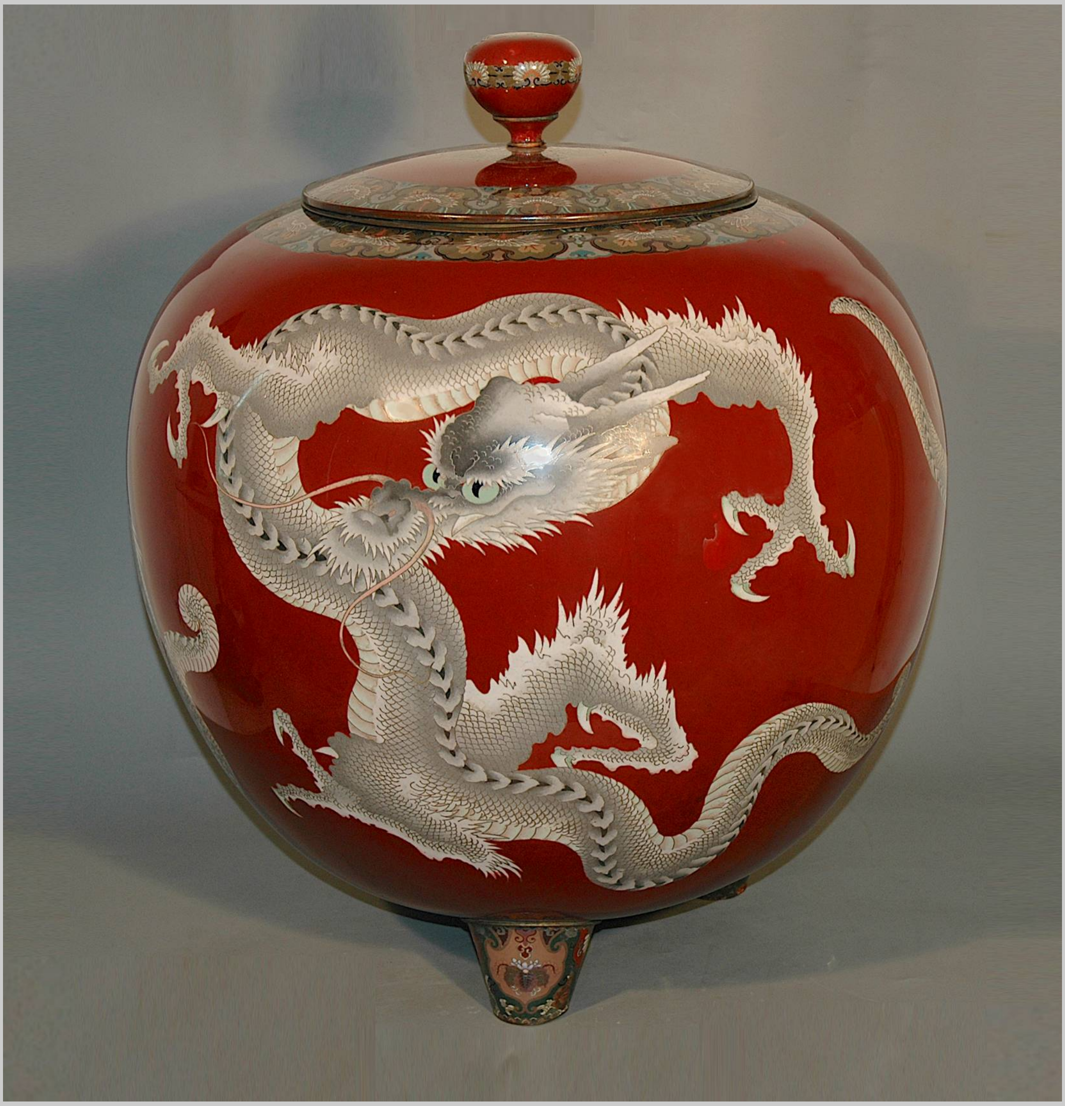




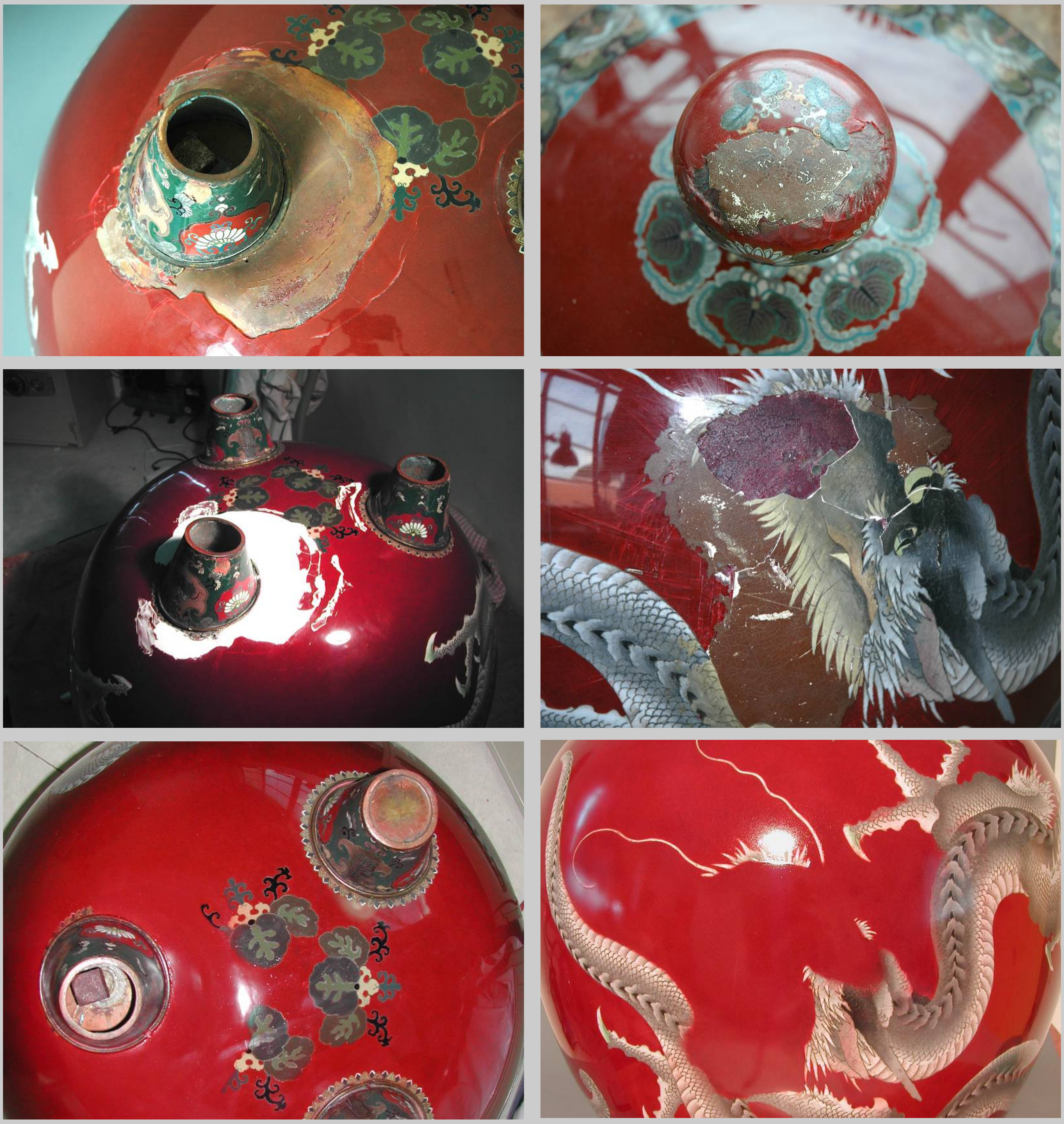




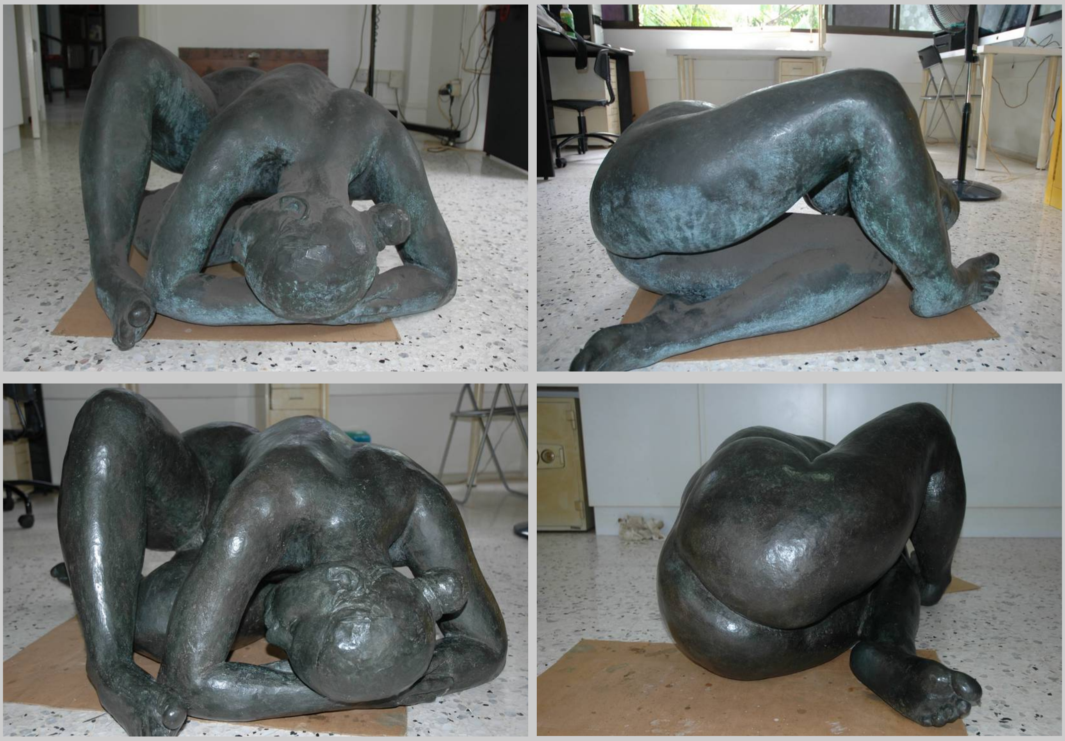
Southeast Asian, Laotian Bronze Rain Drum. The top features a star at the centre surrounded by concentric decorative bands and four stacked figurative finials. The body is flanked by strap handles and bands of decoration. The previous restoration failed. The paint was removed, the fracture joined with a reinforced synthetic polymer. The gap was filled and colour-matched.



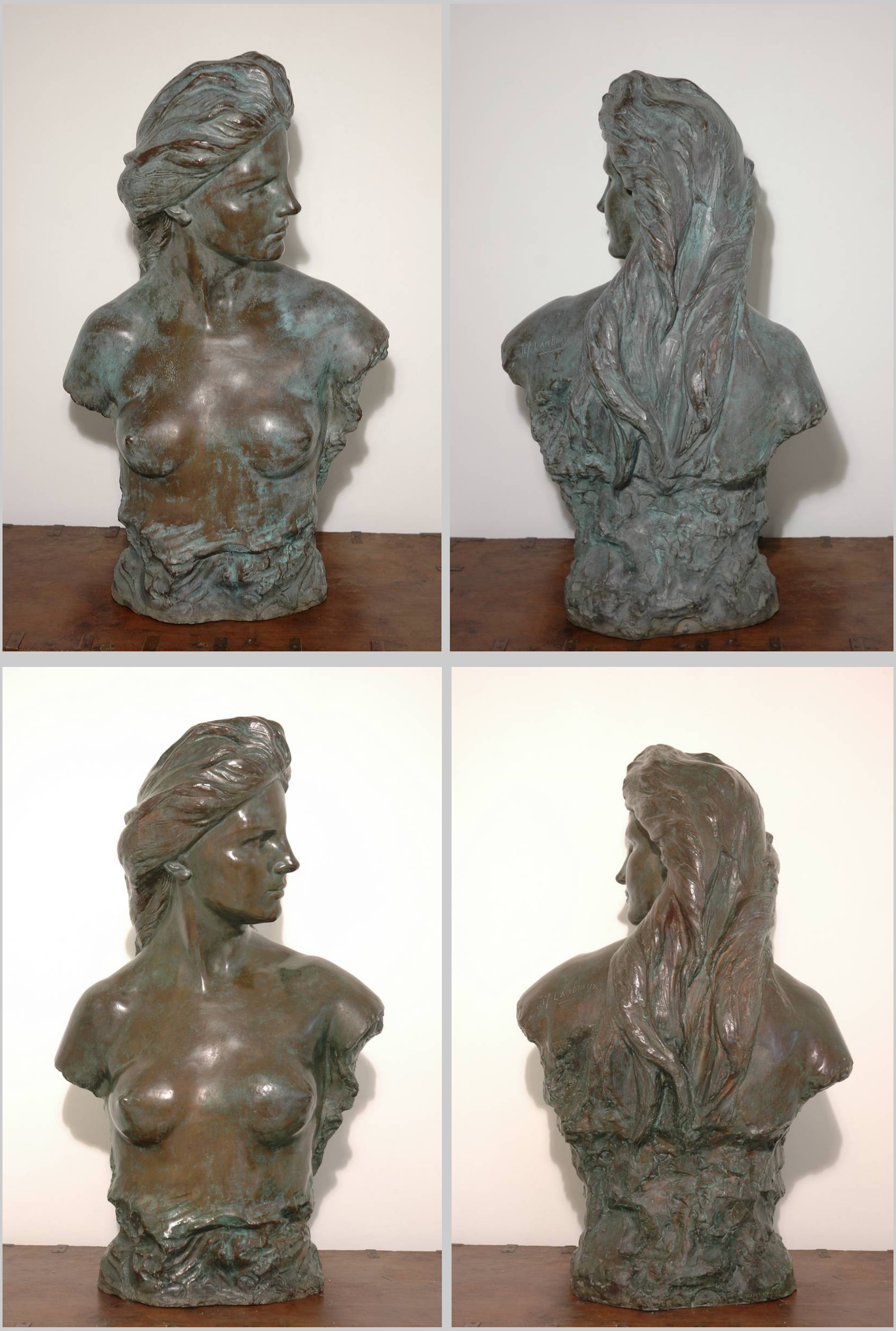
Copper alloy enamelled Japanese container executed in the cloisonné technique from the early 20th century. A number of areas were severely damaged and the copper dented. There was an old plaster fill and oil paint restoration that had failed. The oil paint had discoloured due to oxidation. The pommel of the lid was also extensively chipped and the original enamel was missing.



The old restoration was removed, the damaged areas thoroughly cleaned with solvents. The indented copper was not reshaped, this would have resulted in more enamel loss. The missing enamel was filled with a mineral filler with a synthetic binder. The filler was colour matched with the surrounding background surface. There was no attempt made to repaint the dragon or the ornaments, to preserve the integrity of the original artists work. A final clear coat was added to protect the new surfaces. There was a minimal amount of overpainting which was unavoidable to reunite the surface.

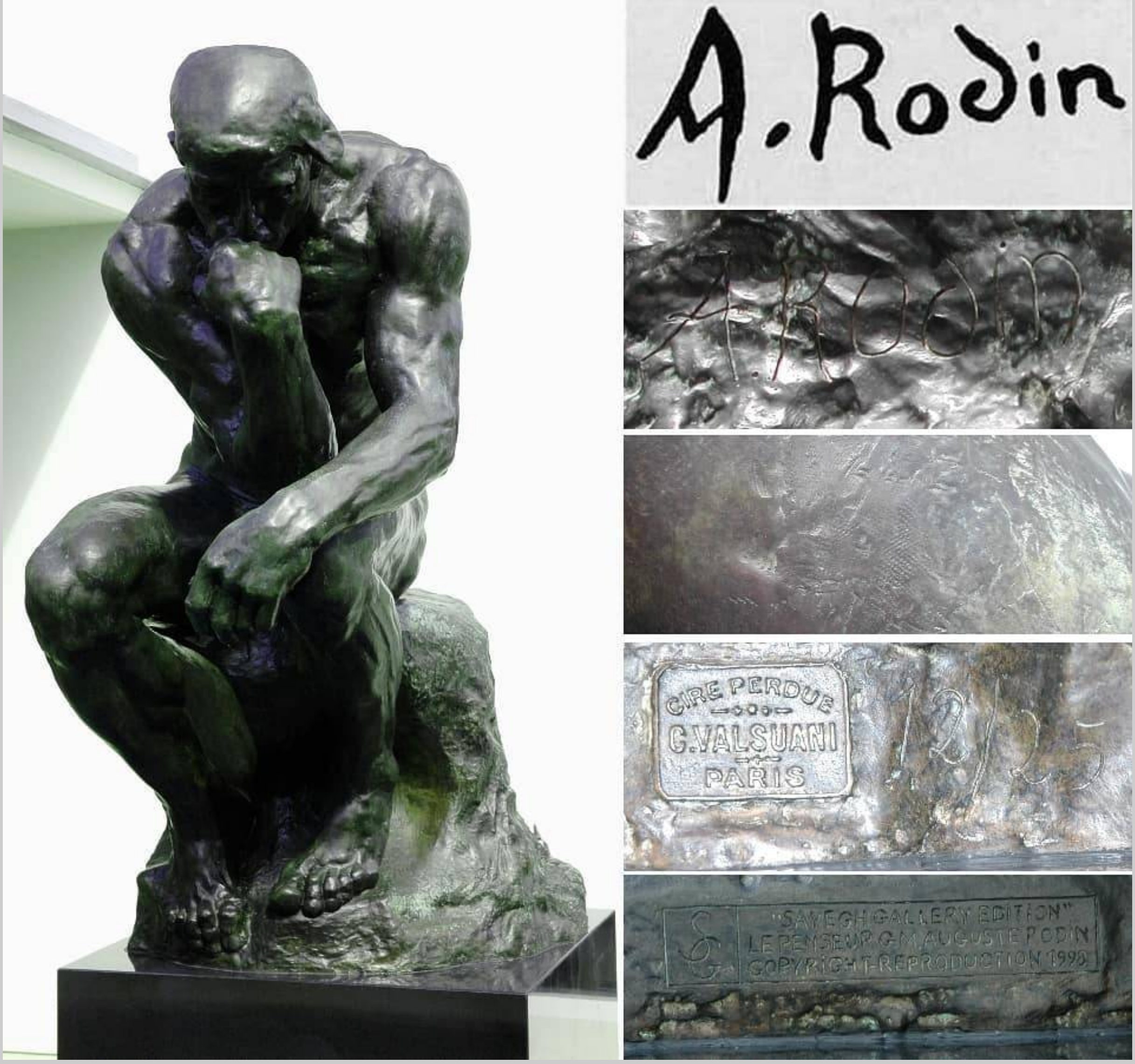


Francisco Zuniga, Dolores, 1976 Bronze. The sculpture displays corrosion usually conform with outdoor display. The light green corrosion is probably copper chlorides that are common in coastal regions. The surface was cleaned and stabilised with a corrosion inhibitor. A synthetic coating was applied that can be removed with solvents The coating should protect from further corrosion and handling.

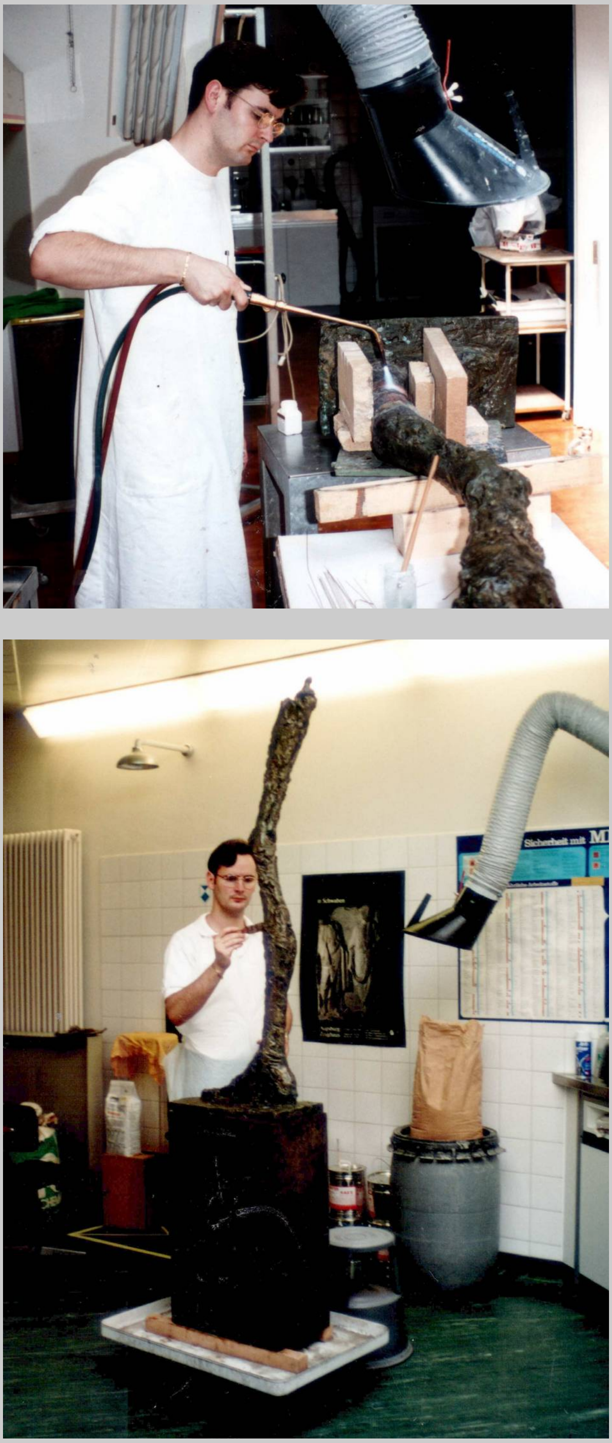


“Female Bust” Bronze Joseph Maria Thomas Lambeaux, Belgium 1852-1908.

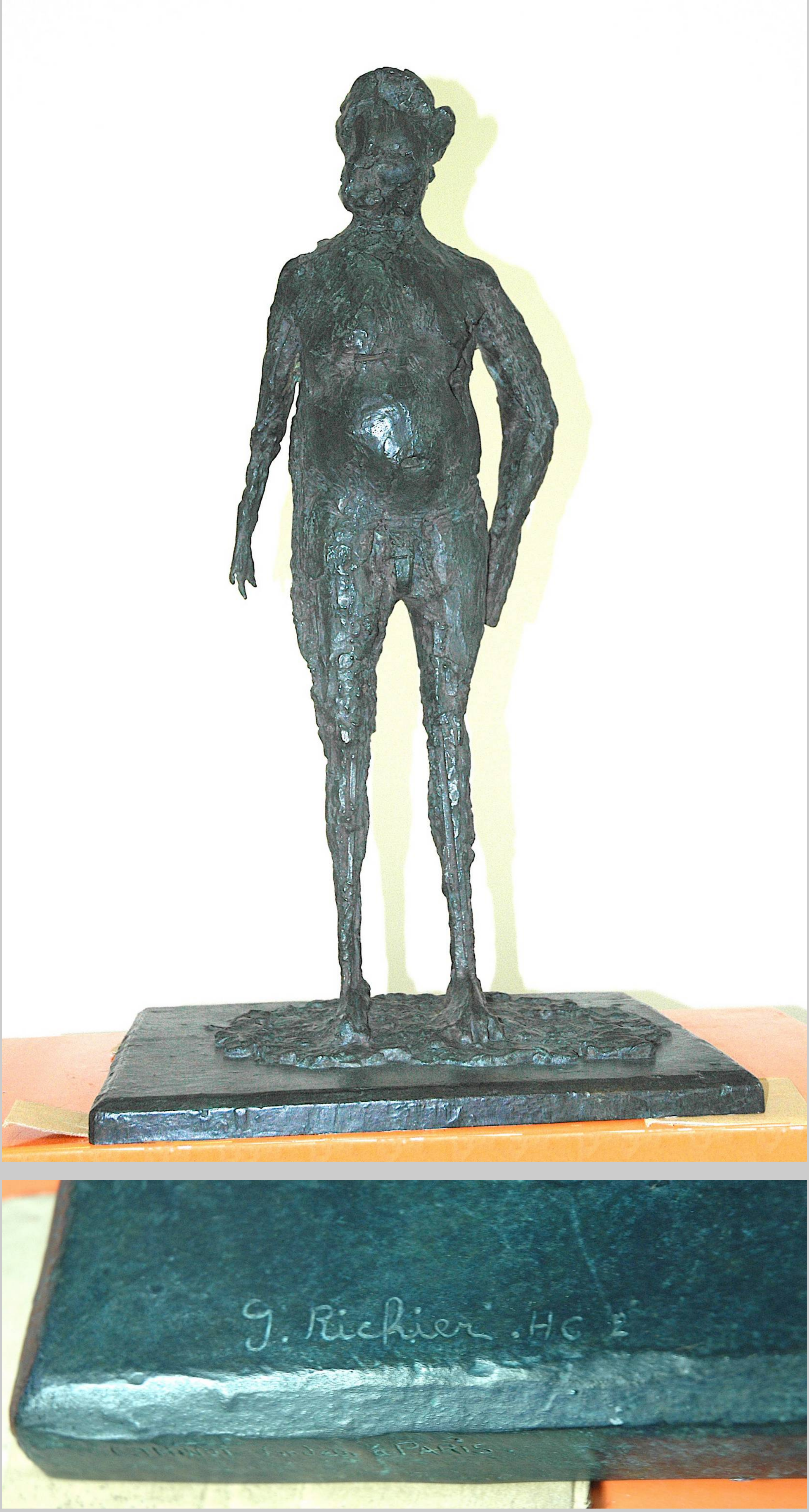
The bust was exposed to the elements and was chloride corroded. The copper chlorides were removed and the figure treated with a corrosion inhibitor. The surface was then coated with a synthetic resin that was solvent soluble. The coating is meant as a sacrificial coating that can be easily removed and if necessary reapplied.



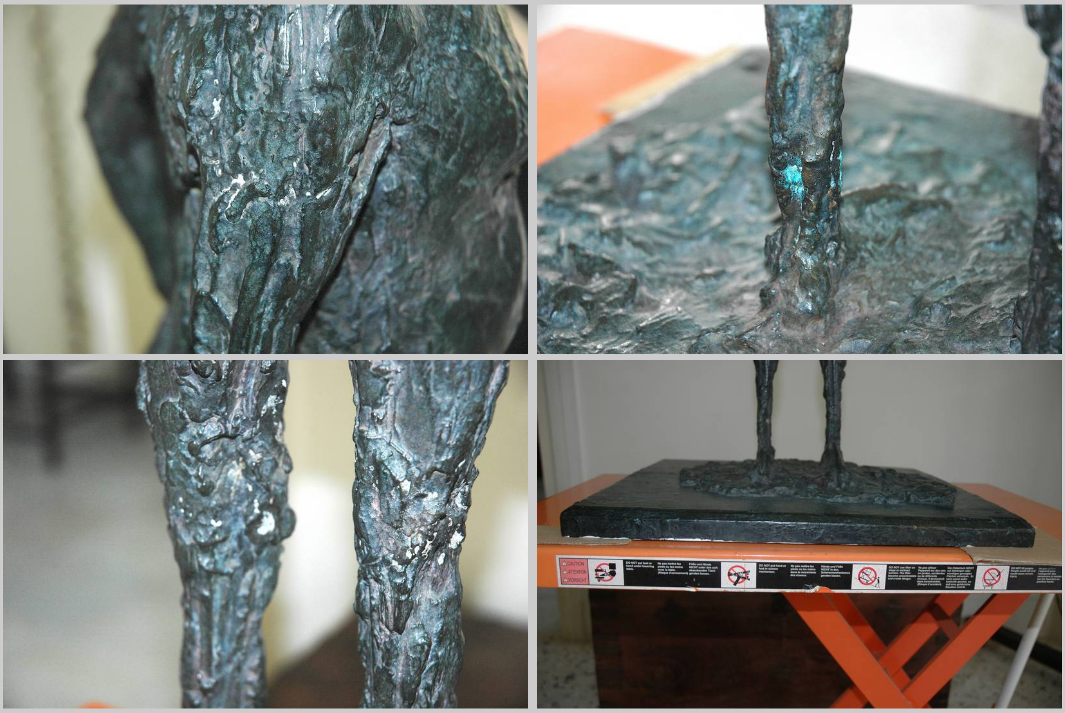
"Le Penseur" Auguste Rodin ca. 1880. However this present example was cast after Rodin's death. Studying the cast it was determined that this is probably the 3rd or 4th reproduction. It is there for not considered an original, it is rather an "Original-Copy". During one of the last casts, a fingerprint from a rubber glove was left in the wax positive, prior to the bronze cast.



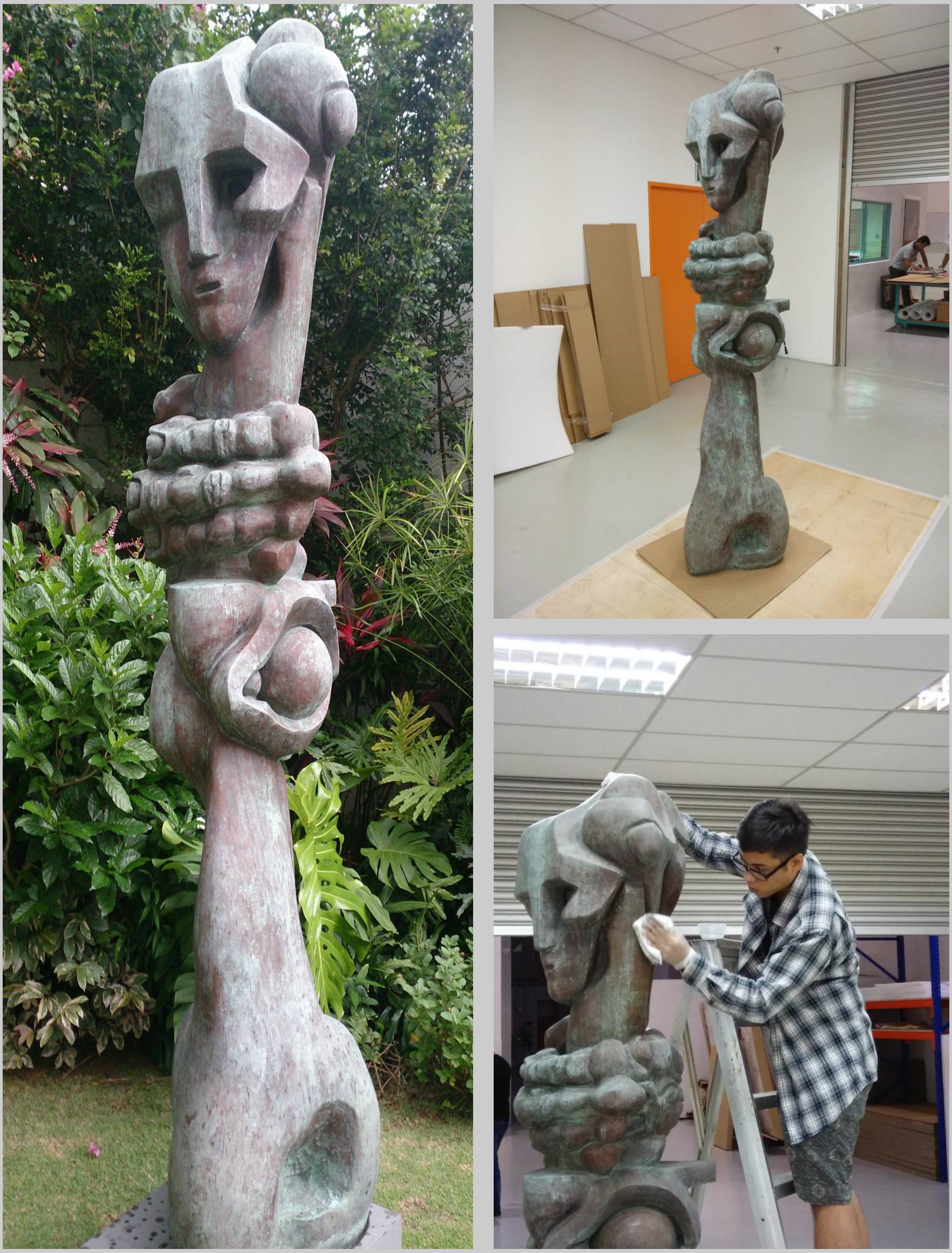
Restoration of “La Jambe”, Alberto Giacometti (1901-1966). Soldering and chemically patinating a large crack, at the Antikenmuseum Basel laboratory for the Fondation Beyeler with its museum in Riehen, near Basel (ca. 1990)



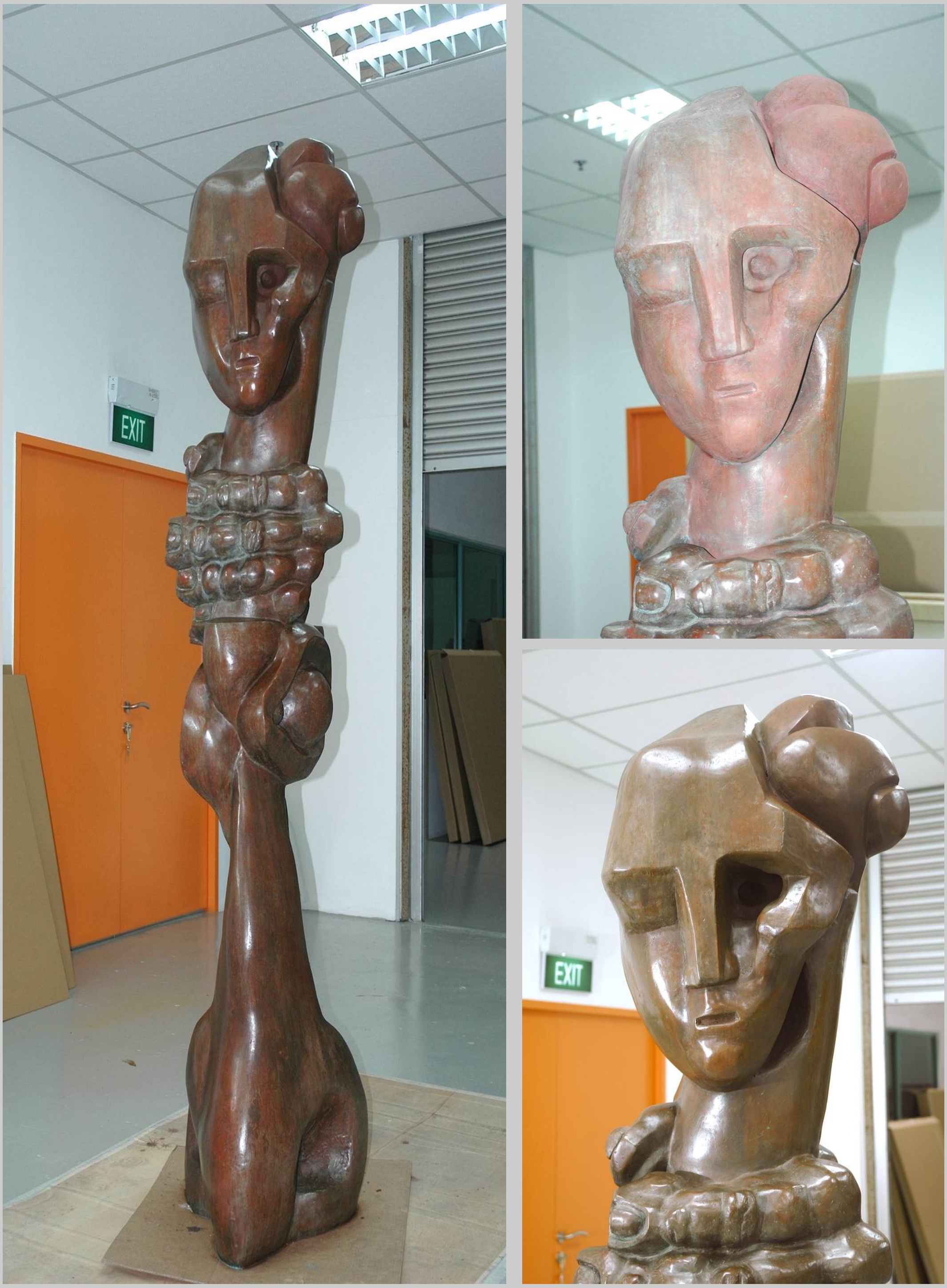
Patinated Bronze Sculpture “L'OGRE” by RICHIER Germaine, France 1949



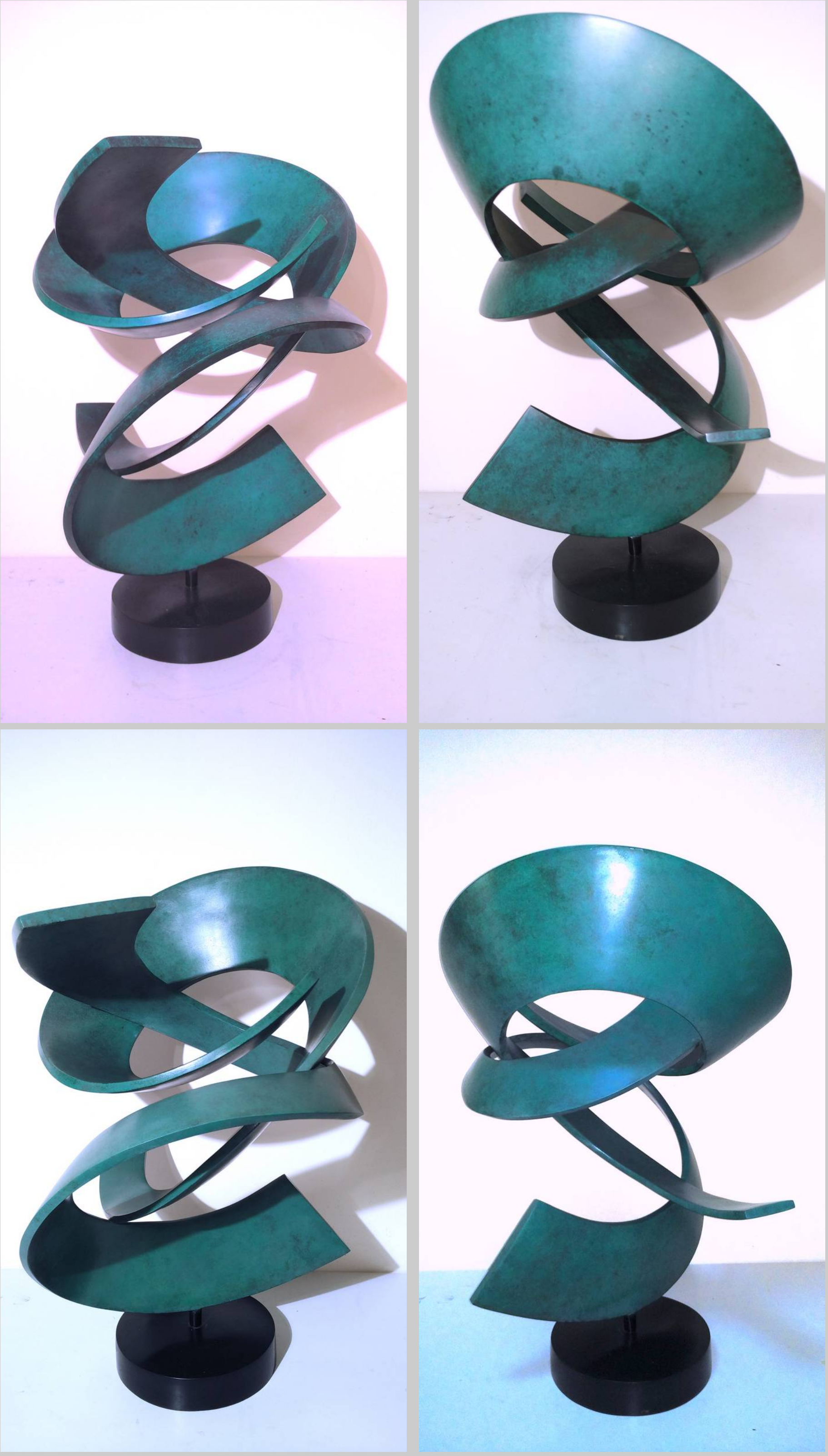
The areas where the limbs were joined with the body and the base plate showed flaws that were retouched. The base plate also contained white blemishes that were removed.



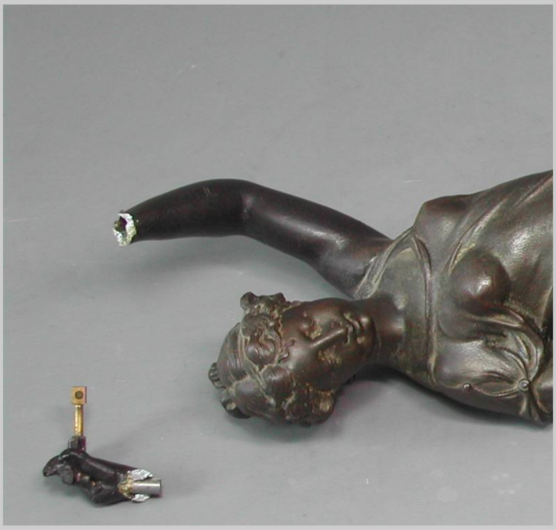
TOTEM ONAN (1981-89) Ernst Neizvestny, Edition: 4+3 AP (4/4) Tree of Life Foundry, coppery alloy patinated, 244 x 76 x 76 cm.The sculpture was displayed outdoors in a tropical, urban, coastal environment and the surface displayed copper chloride corrosion, disfiguring the original reddish patina.

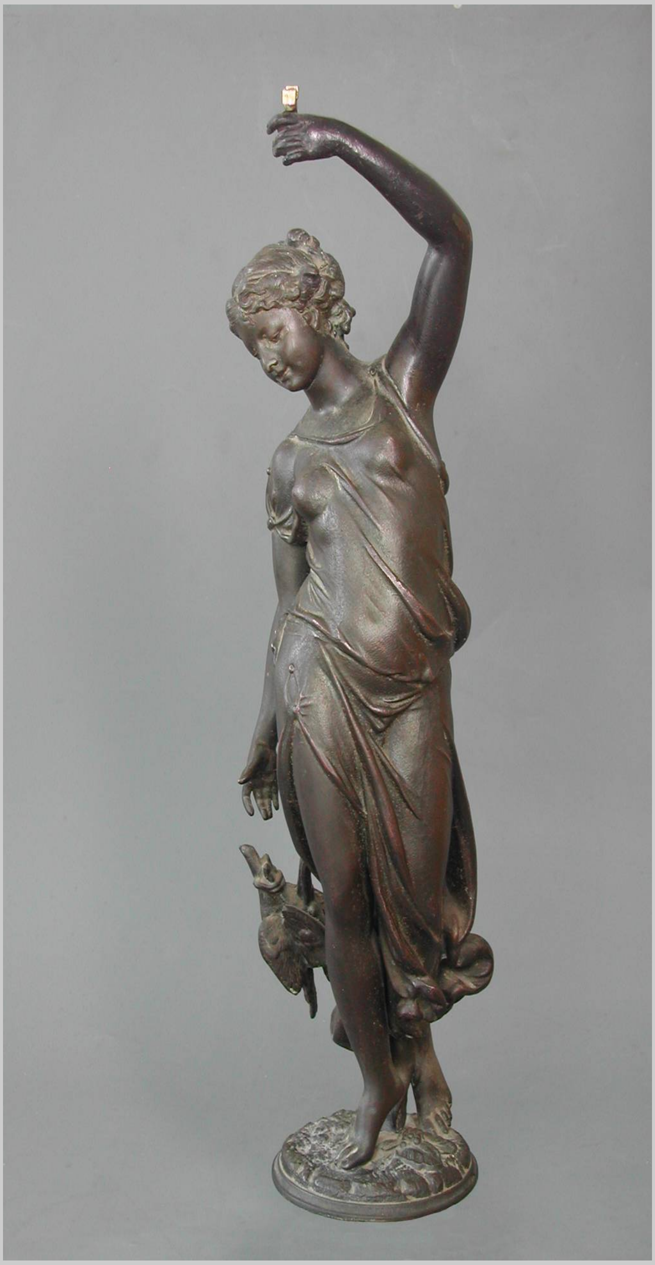


The sculpture was moved into a studio that we rented temporarily near Changi Airport, Singapore. The surface was washed and rinsed with deionised water and surfactant Then the surface was treated with a chemical solution that also contained a corrosion inhibitor. After a thorough rinsing and drying the surface was coated with a high molecular weight sacrificial coating that should minimize future corrosion.



Anthony Poon, Progress 1997. The patina was missing at the edges of the sculpture and was warn and patchy on the flat surfaces due to handling. It was decided not to chemically patinate the damaged areas, since this would have caused further loss of the original chemically coloured surface. It was therefore treated with a strict conservation technique. The warn off sections were retouched with mineral pigments in a synthetic resin binder In this manner the whole process is completely reversible with out damaging the original material.

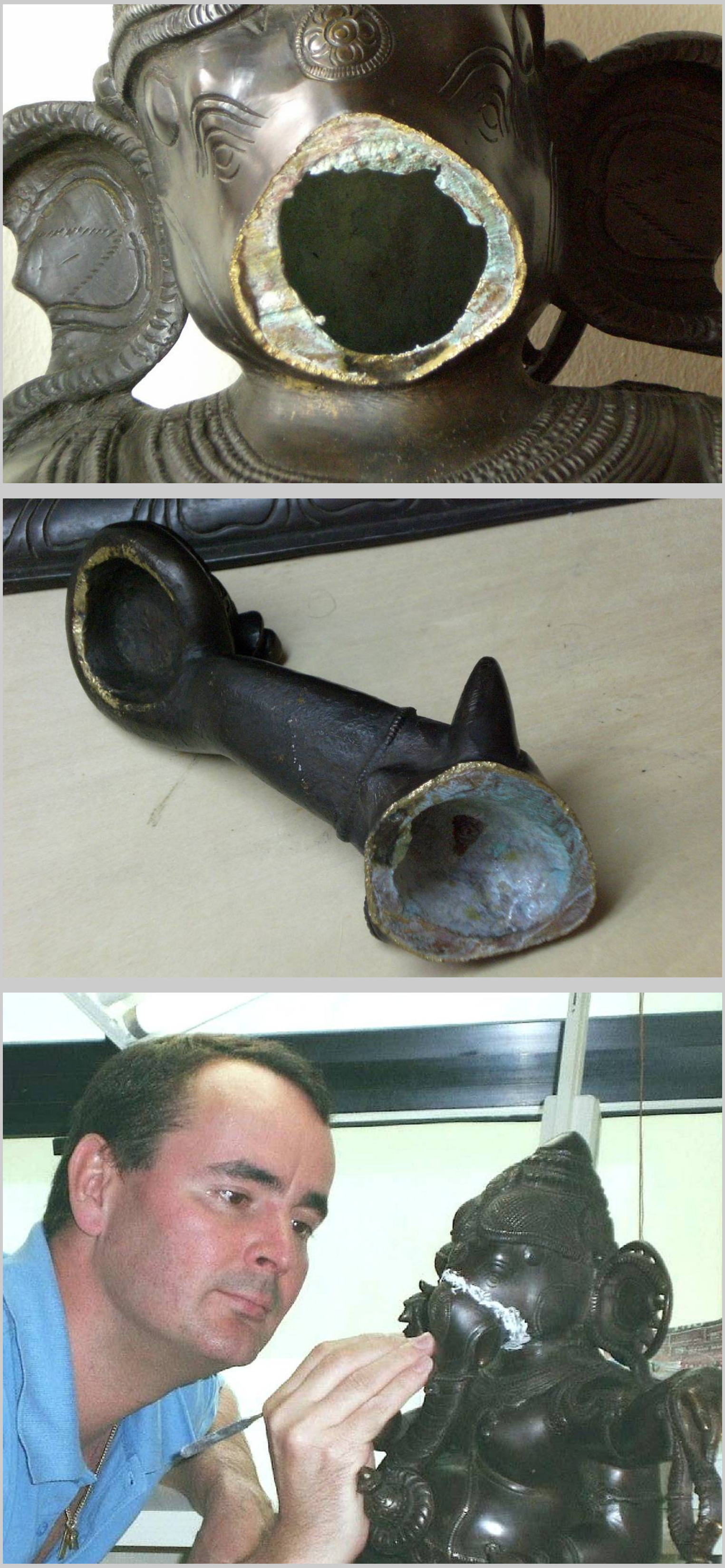




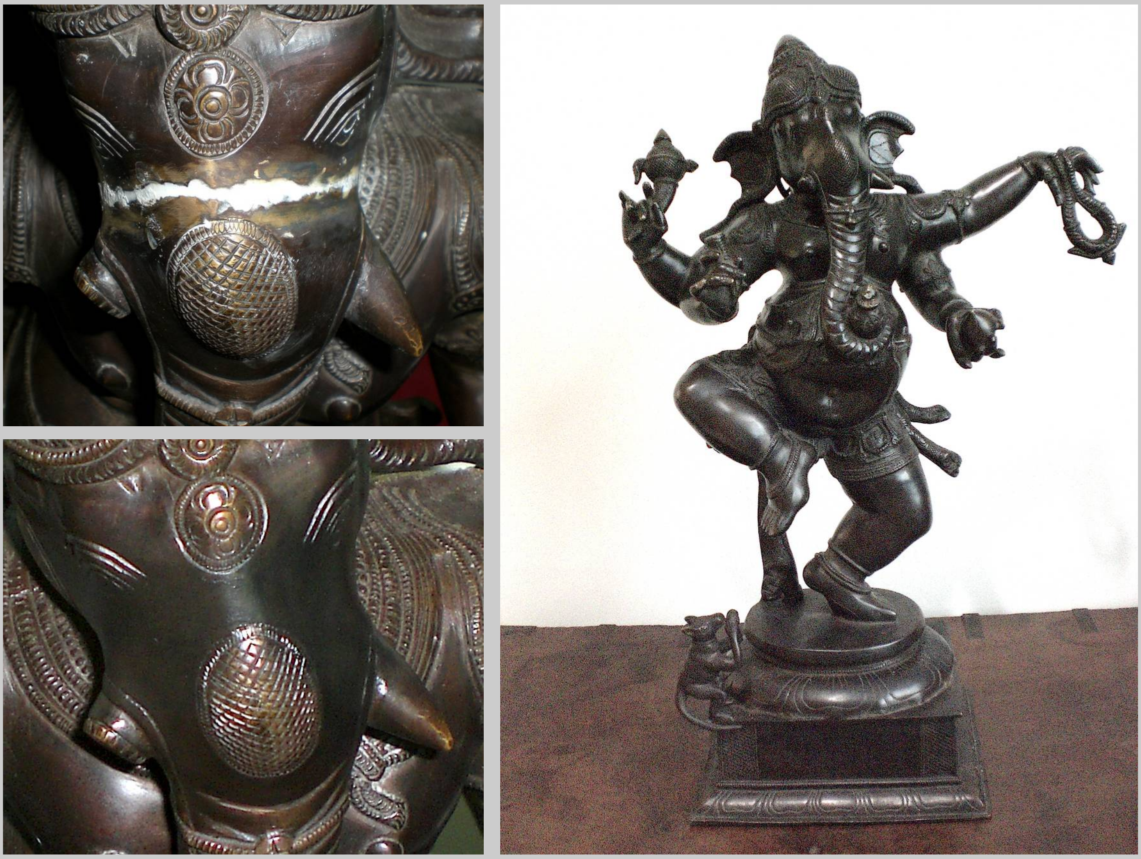
Flora sculpture of a swinging pendulum clock, French, ca 1890.

The raised proper left hand was broken at the wrist.

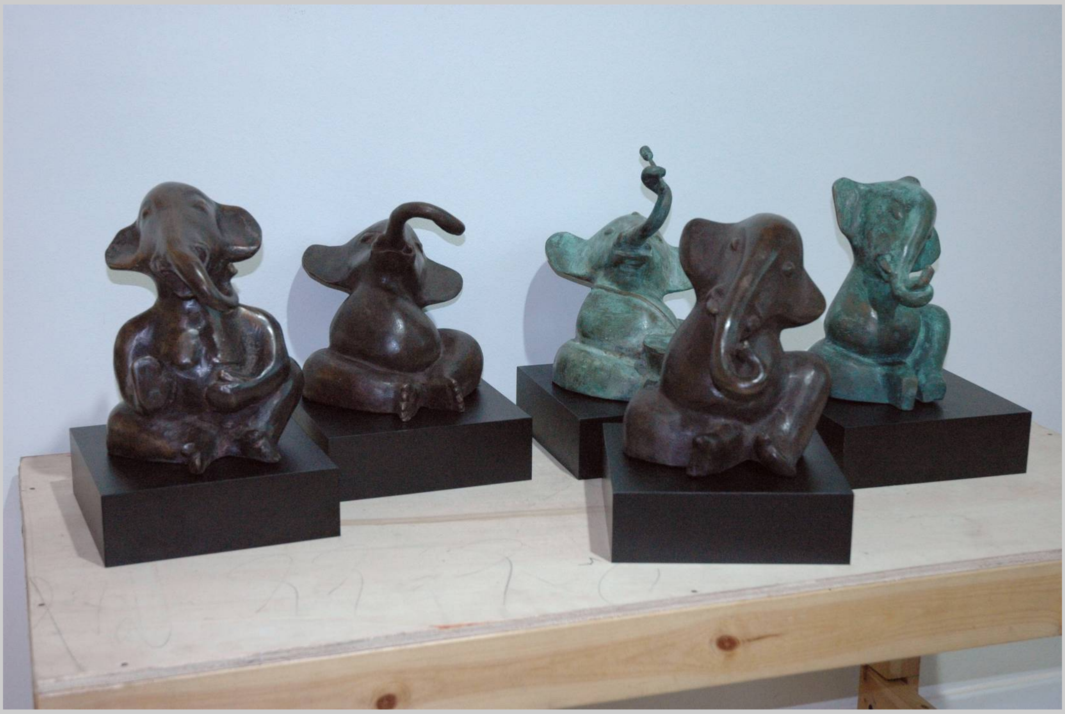
Arm and hand were joined with a dowel and held in place with a two component synthetic resin. The missing areas in the fracture were gap-filled and retouched with acrylic colours.



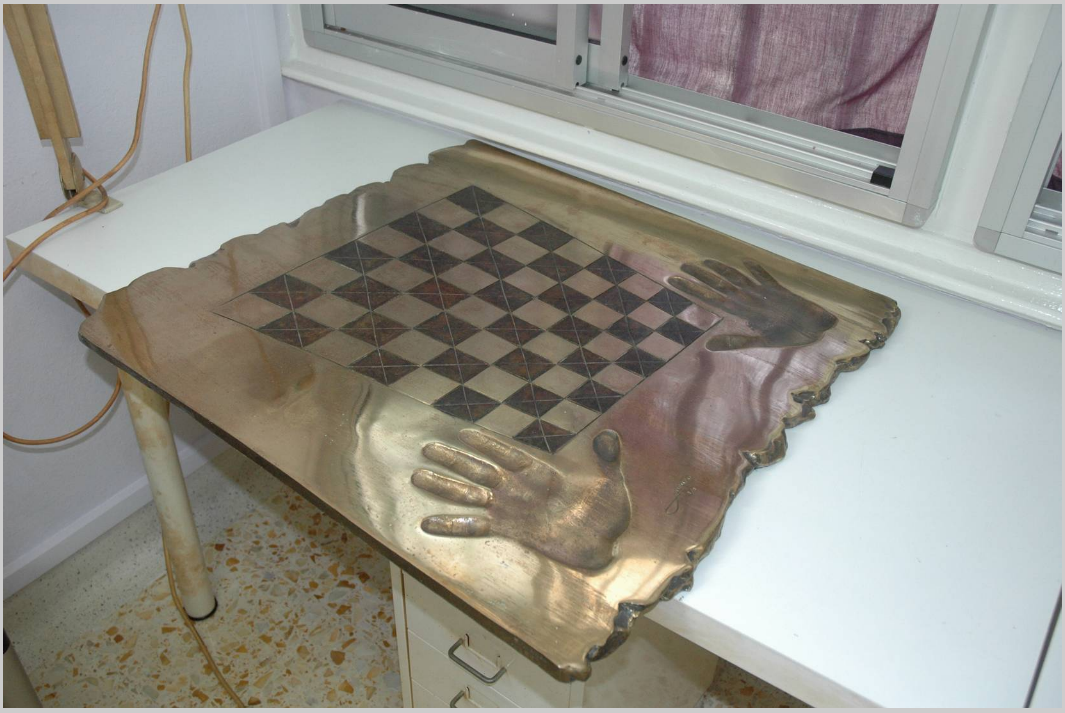
Contemporary bronze Ganesha with the trunk fractured. The hard soldering of the separately cast segments was executed in a manner that was easily broken. The two pieces were joined using a two component polymer. Gap-filled with a resin containing a filler and retouched with synthetic colours.

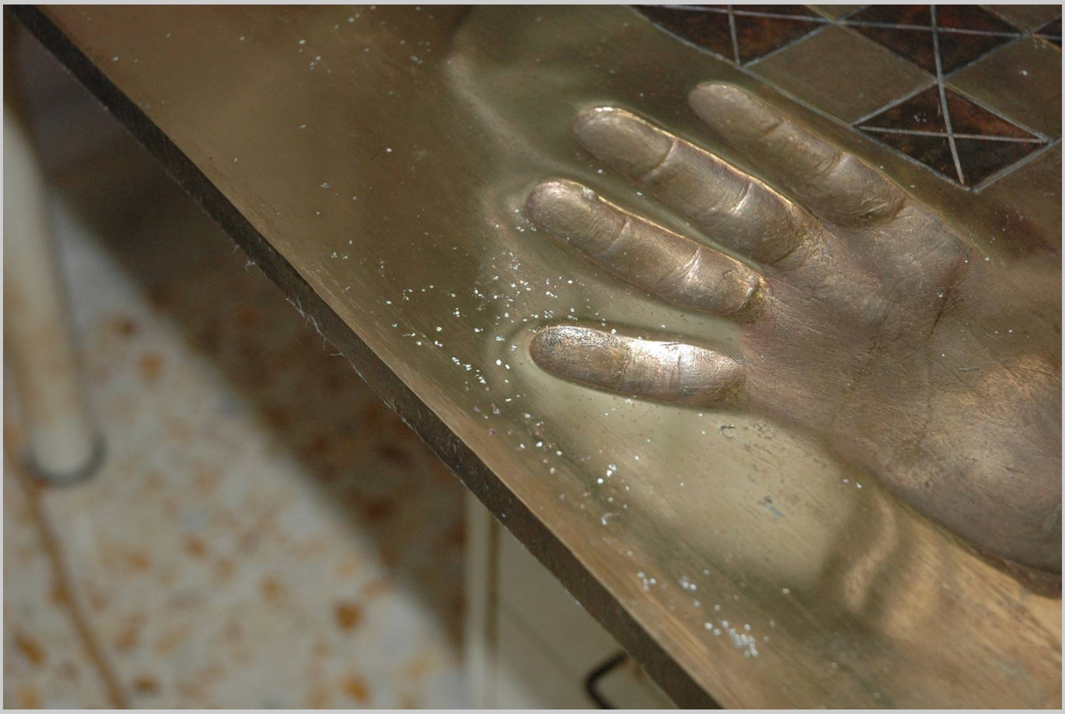


During the levelling of the filler the adjacent very thin modern patina was removed and had to be retouched. Hard soldering was not considered since this would have damaged more of the patina and the head and trunk. The restoration of the damage was almost invisible and mostly reversible.

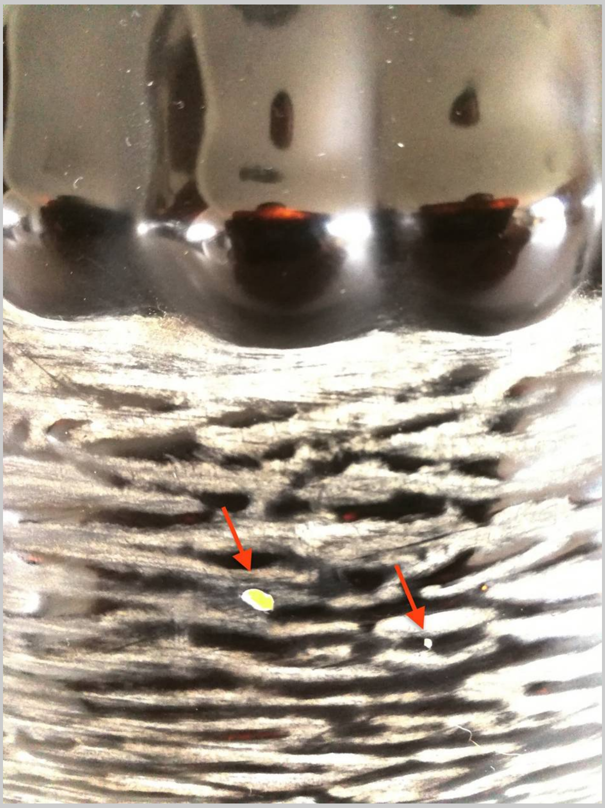


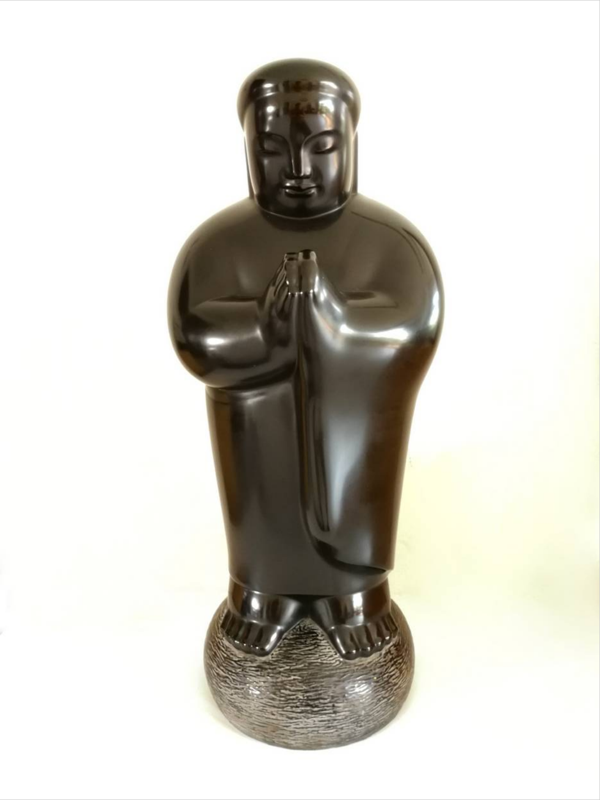
Contemporary GaneshaS by S. Kumar (~2006), the sculptures had to be re-patinated. After the treatment the chemicals were neutralised and the surface waxed. A more neutral black base was also designed.

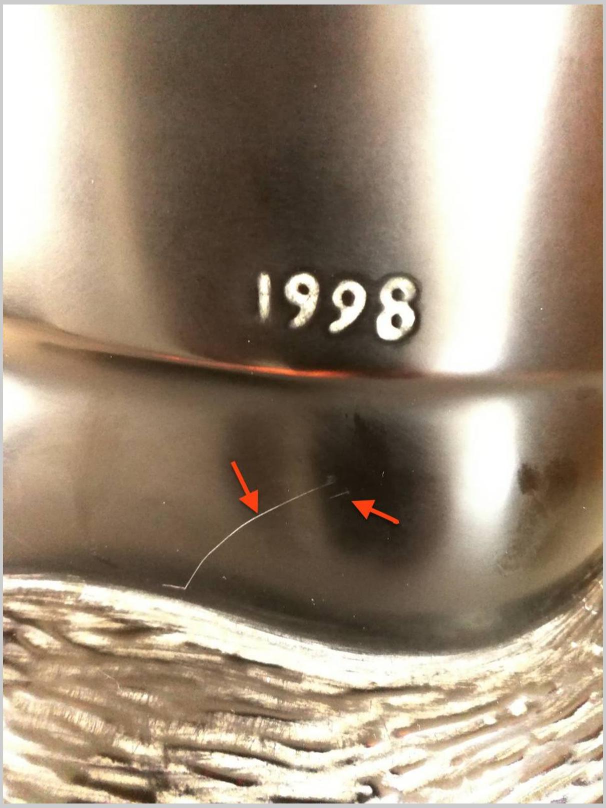




Lorenzo Quinn, Chess Set, Queen Table, Bronze, Measures: 106,5 x 65,5 x 72,5 cm.
The proper left hand imprint has what seems to be chloride corrosion on the right side of the horizontal adjacent surface. The corrosion was removed mechanically and treated with a corrosion inhibitor. This was followed by a synthetic museum grade reversible coating.



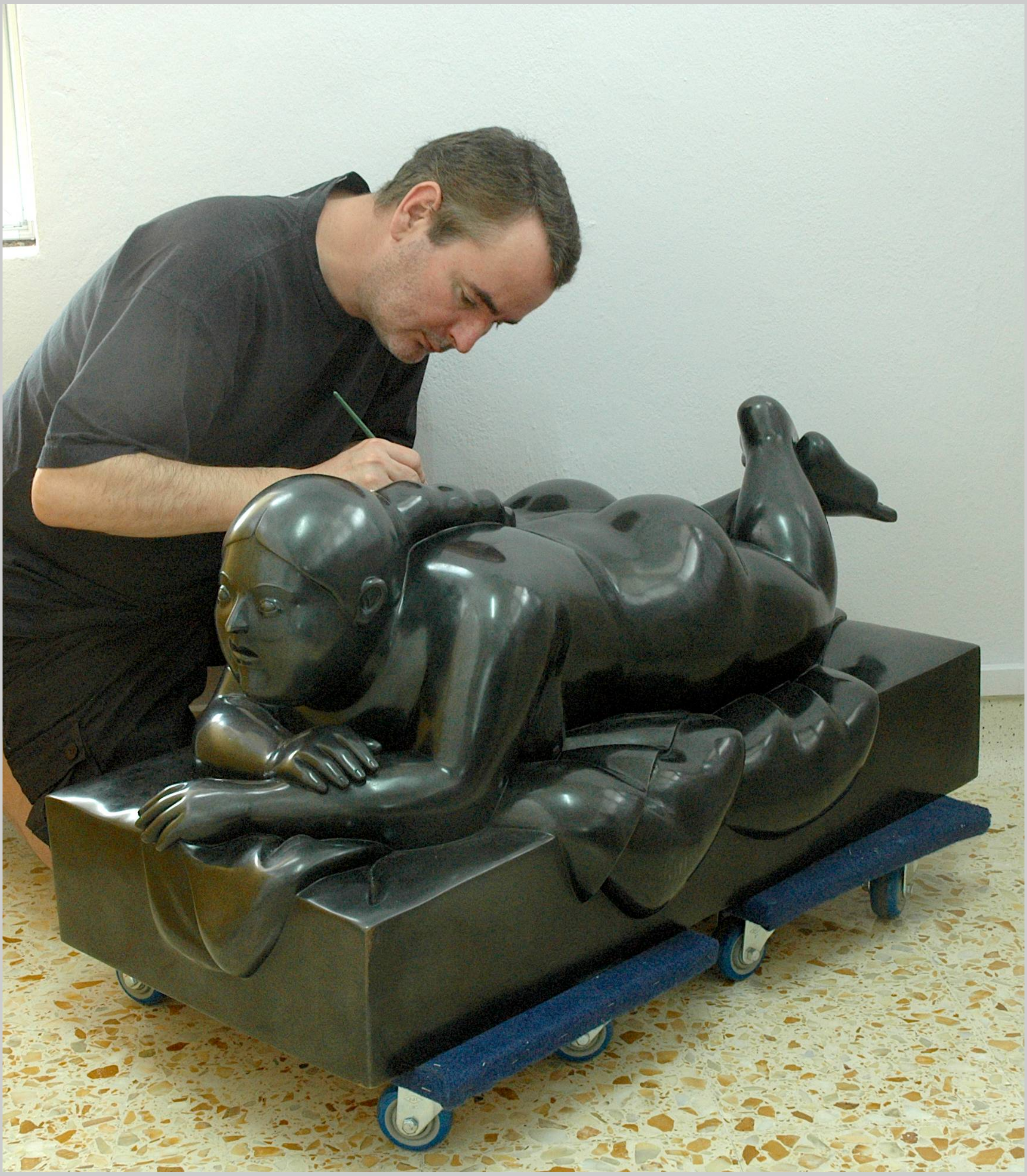




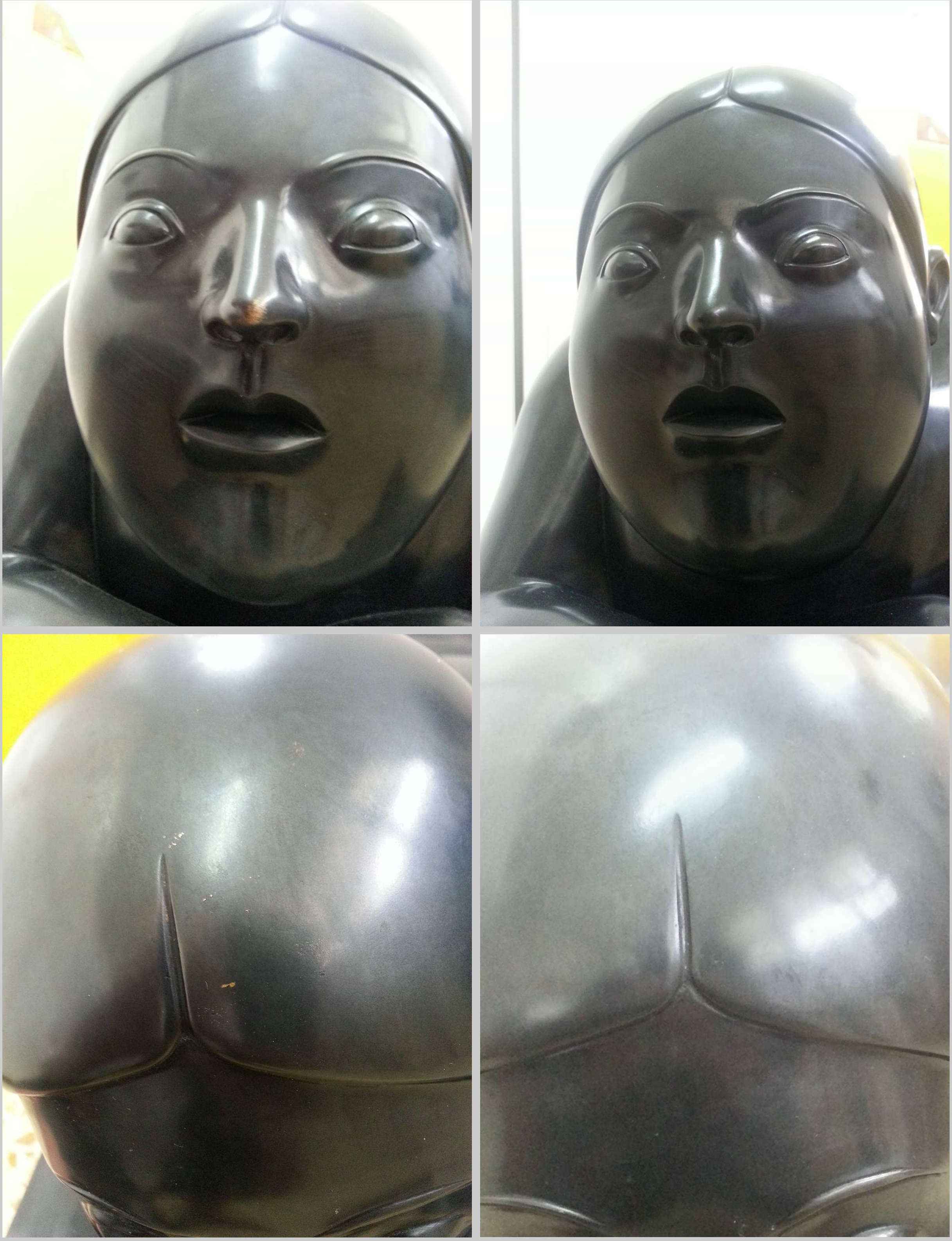
Li Chen “All in One”, ED 7/8, 1998, bronze, 72 x 30 x30 cm.

There was a deep and a minor scratch on the proper right side of the heal of the proper left foot that penetrated into the metal alloy. Two chippings in the front centre of the silver cloud were also penetrating what seemed to be a primer layer under a painted layer (however that could not be confirmed).

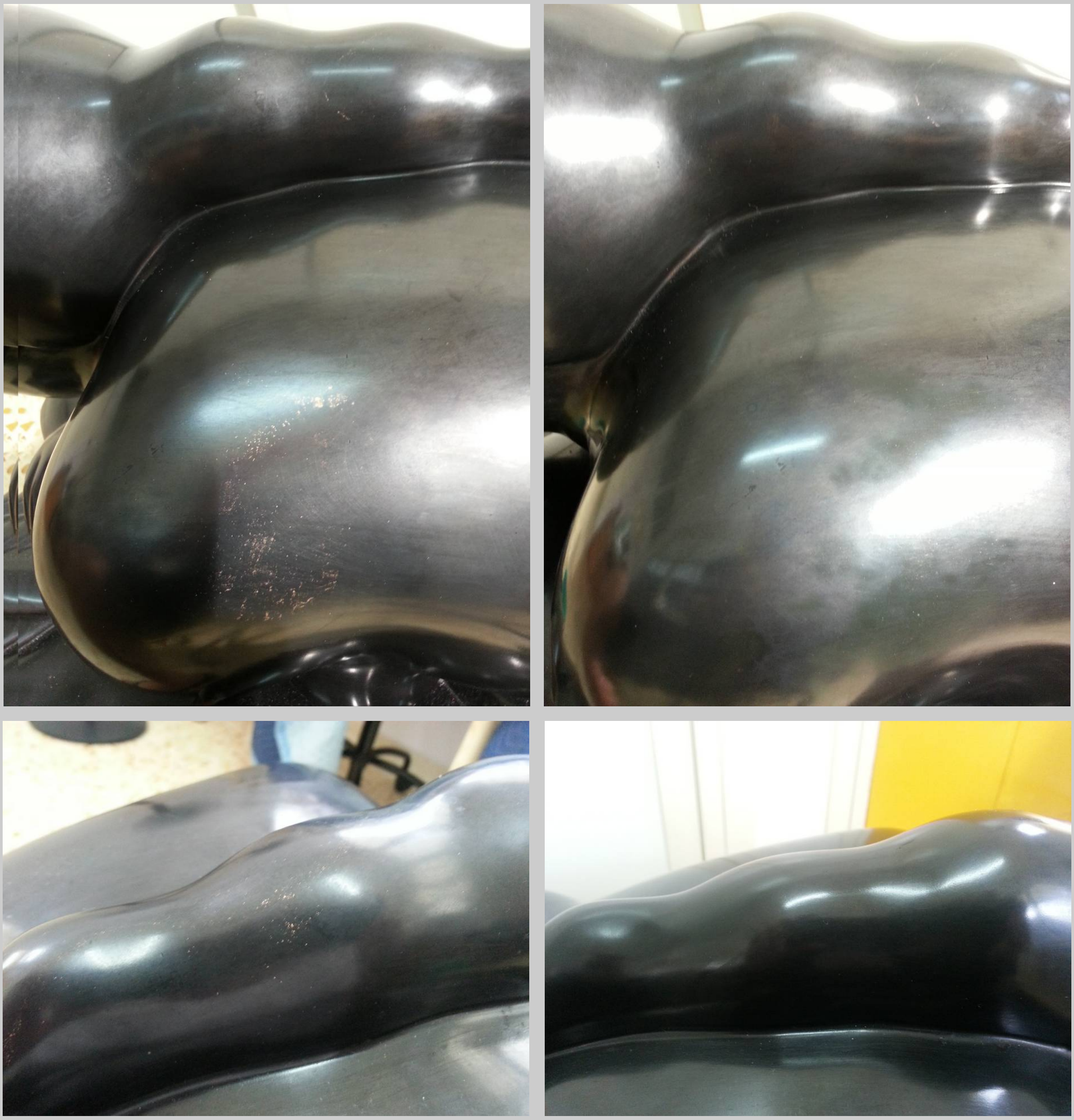
The scratch and the chipped areas were filled with a synthetic binder mixed with a very fine filler. Gently shaped to be level with the original surface and in-painted using synthetic solvent based colours. These areas were then covered with a clear lacquer and waxed with a protective micro-crystalline coating. The treatment is completely reversible and did not affect the original surface.



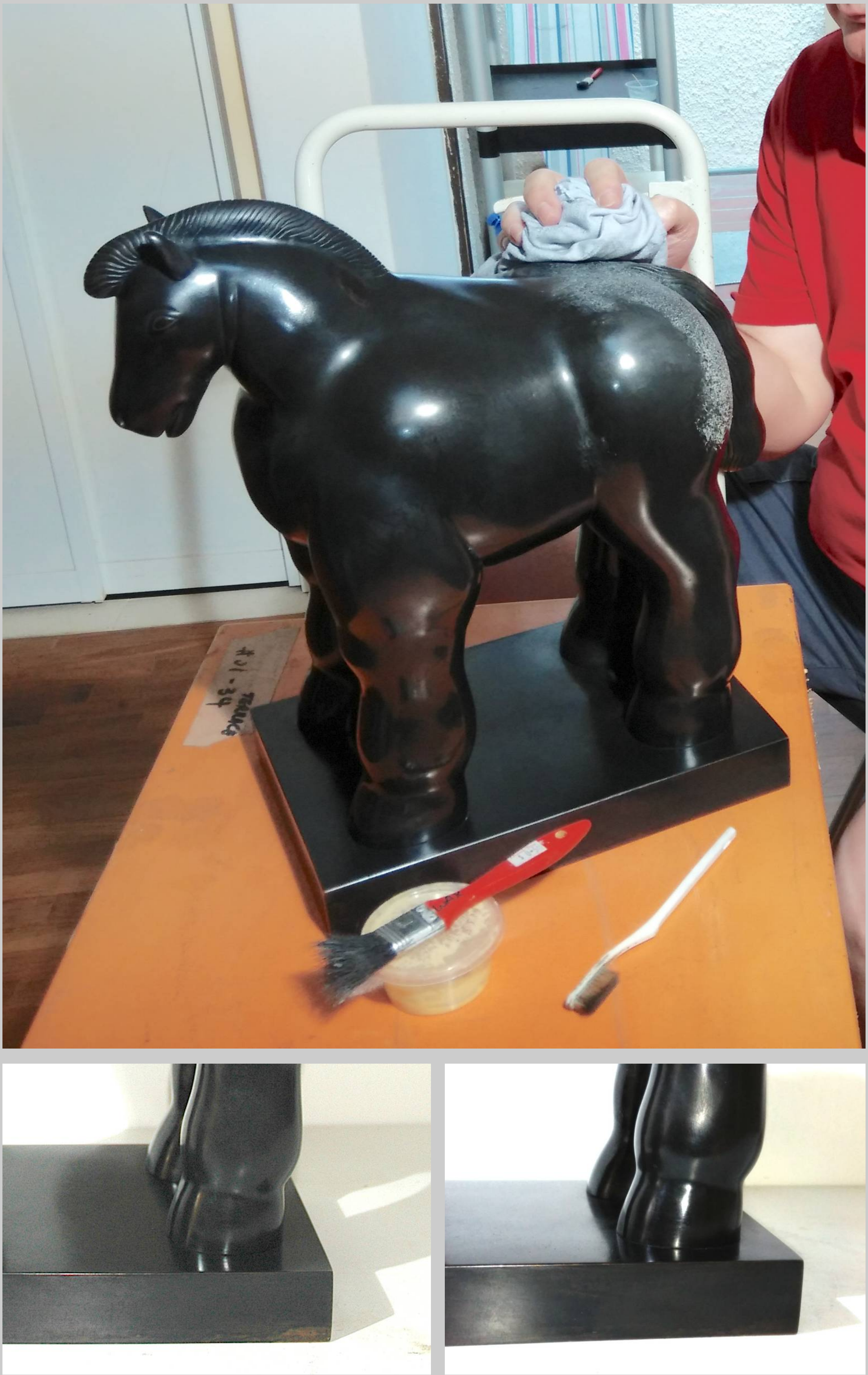
Fernando Botero, Femme Nue Allongee, 2000, Bronze, 52 x 108 x 56 cm, edition 2/6.
During condition checking various minor blemishes in the patina were established. The paint was colour-matched, dissolved in solvent. There was minimal overpainting, which was unavoidable to ensure the restoration was not visible. The areas were then coated with a clear lacquer and waxed with a protective microcrystalline wax coating. The whole restoration is reversible.



Nose and forehead of the figure with blemishes. On the left side the unrestored areas on the right side the treated surface.

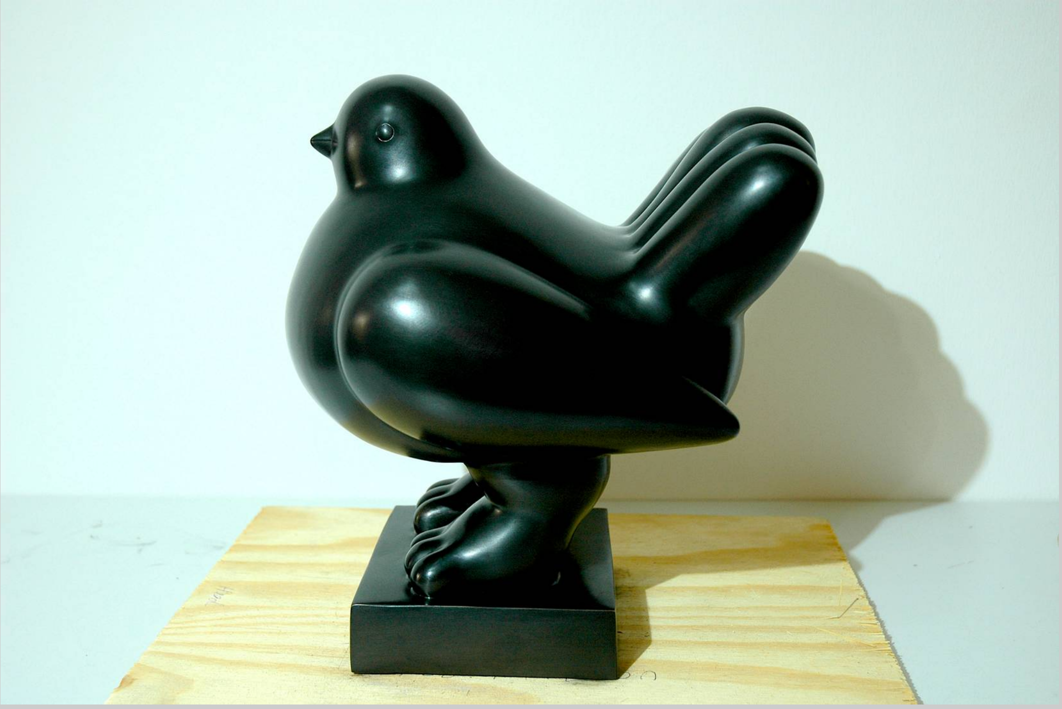


Blemishes in the patina on the left shoulder and the hair of the sculpture, shown in the left images. The right images are the same areas after restoration. The overpainting was minimal and some previous restorations were not treated since it is not clear if this is done by the artist or its foundry to retouch the original patination.

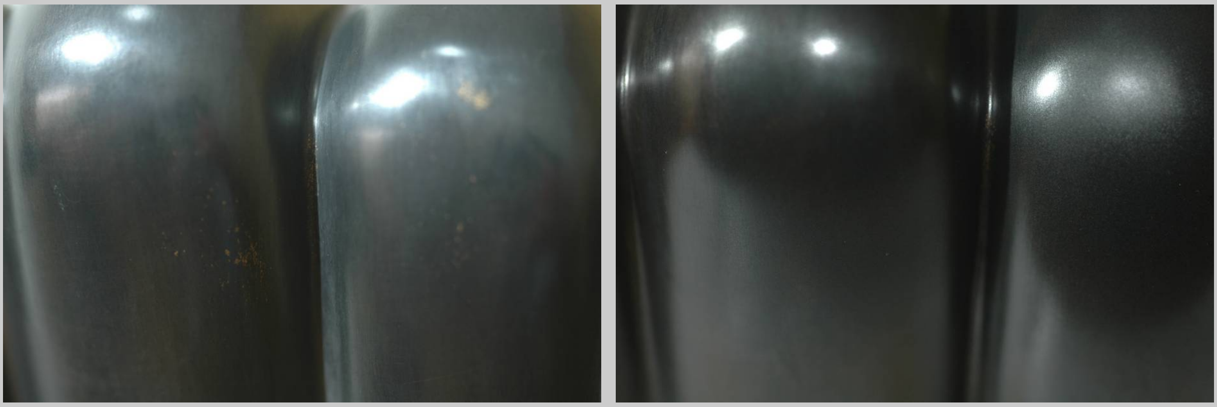


Bronze Horse, by Feernando Botero, 44.5 x 22 x 38.5 cm.

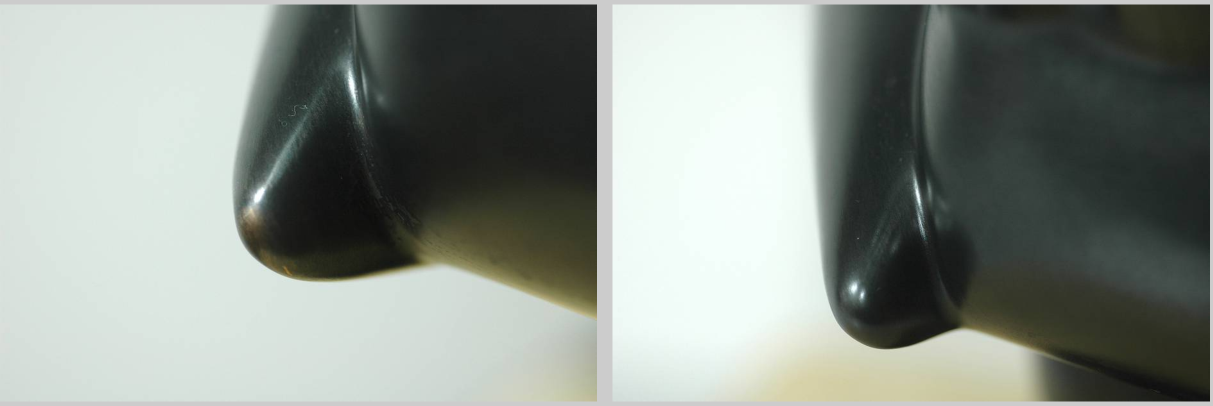
In various areas of the surface the patina was rubbed off, uneven or scratched. The surface of the bronze was cleaned and the blemishes were colour matched, and the complete surface coated in a protective layer of microcrystalline wax and polished.



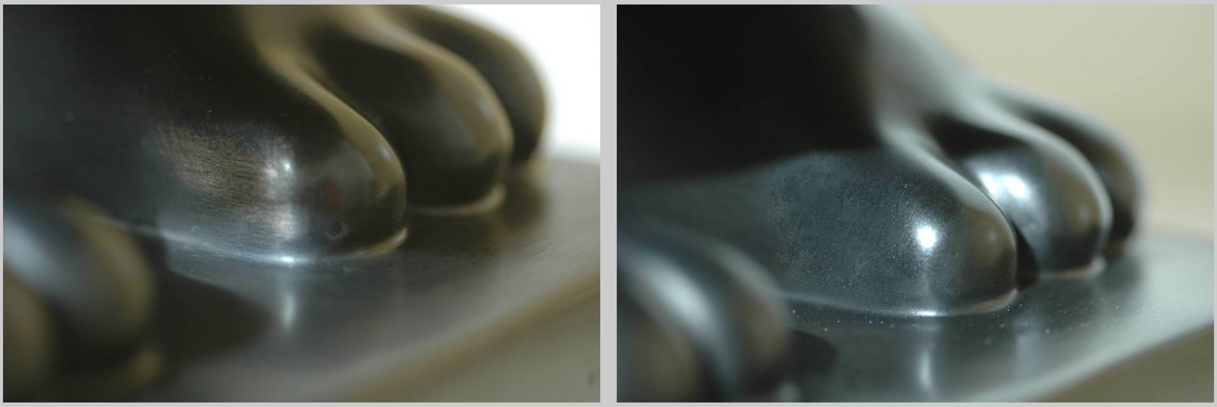
Fernando Botero (b. 1932), “Little Bird”, (40.6 x 45.1 x 40 cm.) Executed in 1988.
The patina has various abrasions and blemishes and in these areas the metallic surface was exposed.



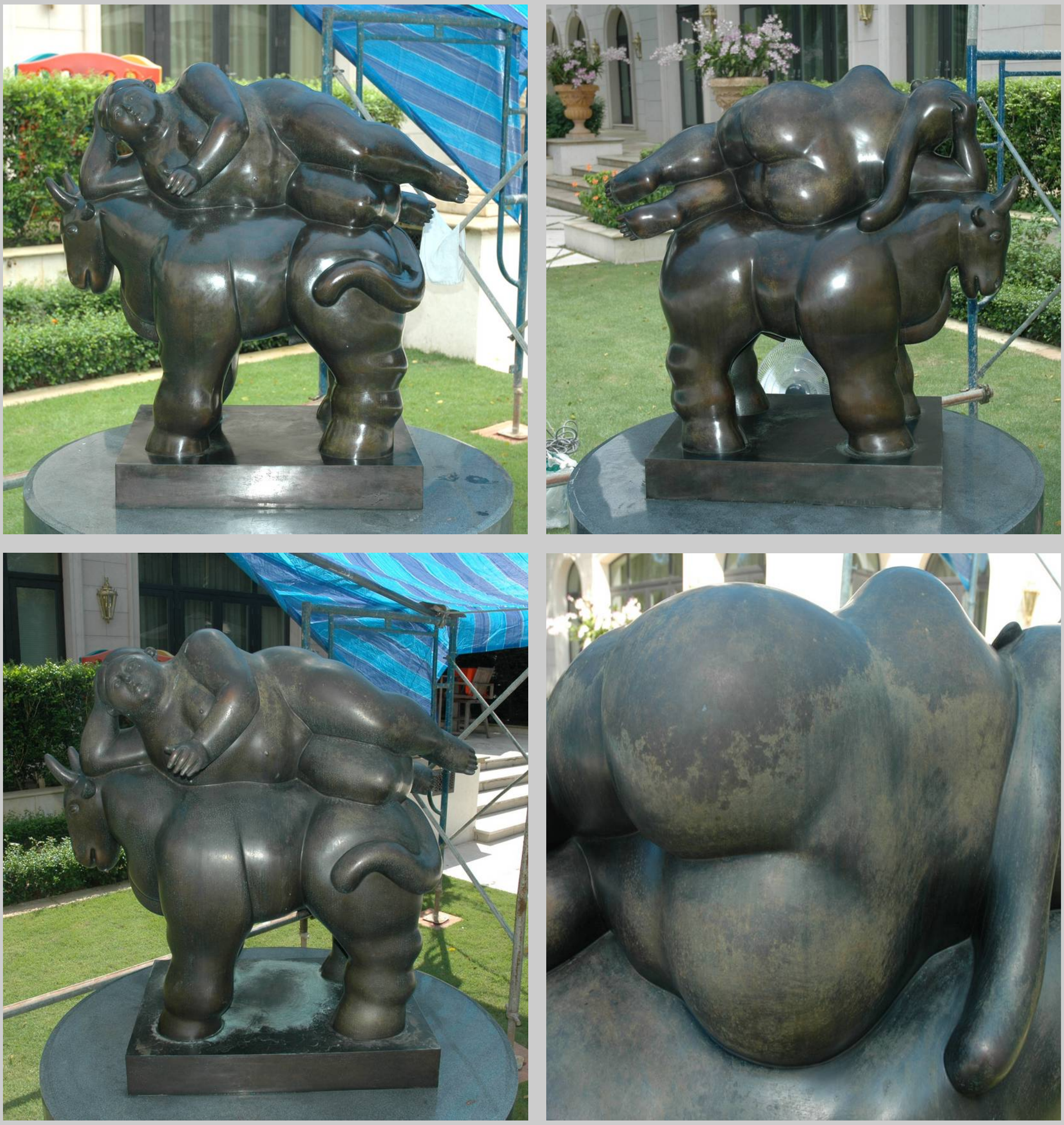
Abrasion on tale feathers before and after conservation, the image on the right was taken before waxing to minimize glare.



Proper left tip of the wing had abrasion and had to be treated.



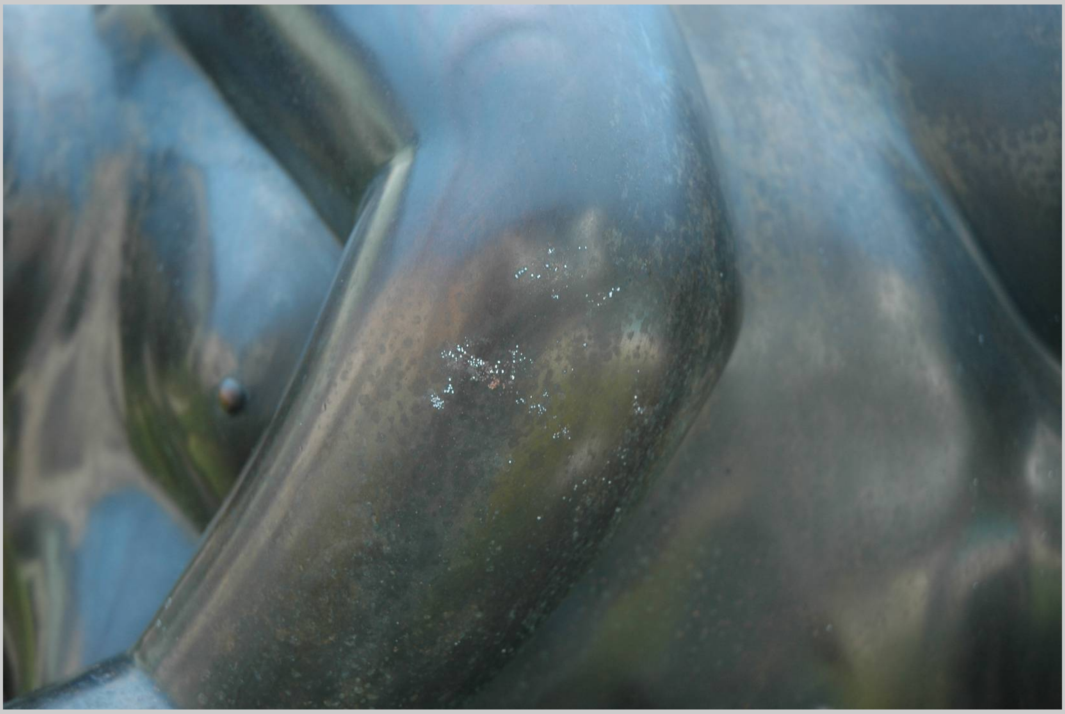
Faulty patina on the proper left toe, before and after conservation, the image on the right was taken before waxing to minimize glare.



Botero “Rape of Europe” 5/6

The bronze sculpture was in very poor condition and heavily corroded when we started the project. It was agreed to do the basic maintenance of washing and coating the surface with a wax.

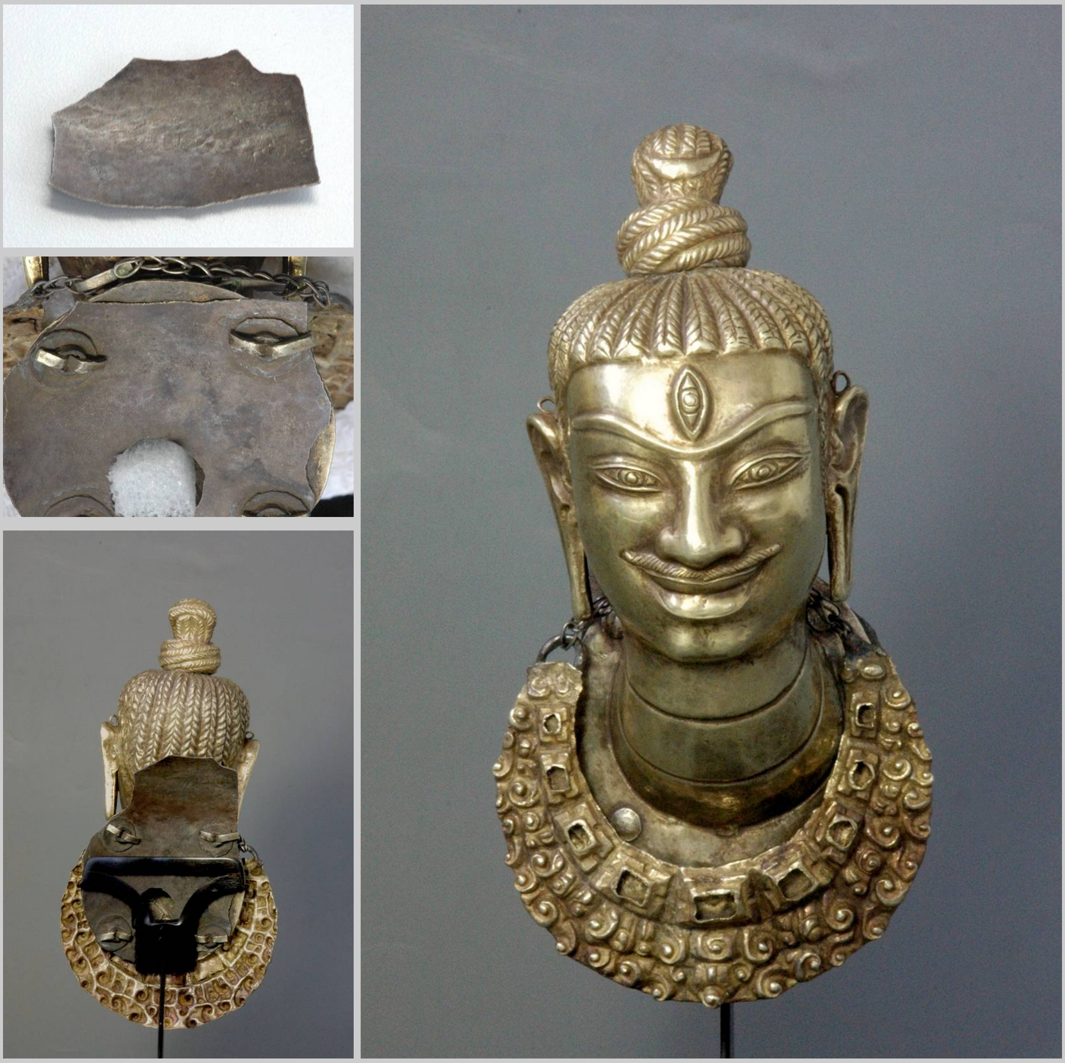
The corroded patina was not enhanced by other means.



However, it was discovered that within 24 hours after the cleaning, white powdery spots appeared on parts of the surface. After testing it was discovered that these are soluble salts crystallising on the surface.

This suggests that the sand core remaining with in the bronze contains soluble salts.

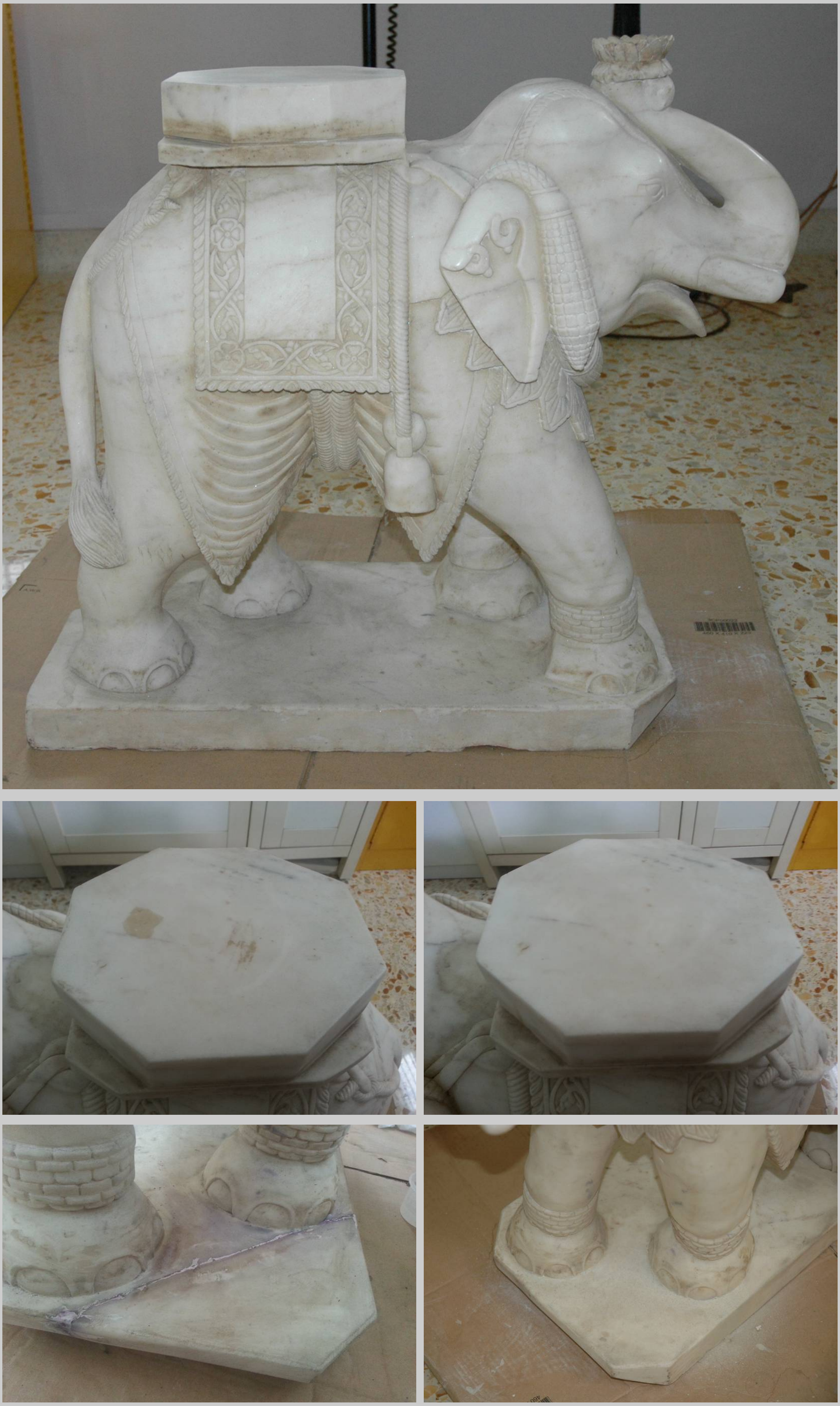
The only remedy would be the removal of the remaining sand core and the restoration of the original patina. Should that not be a possibility the sculpture should be kept at an RH of 41% to prevent the copper alloy reacting with the salts.



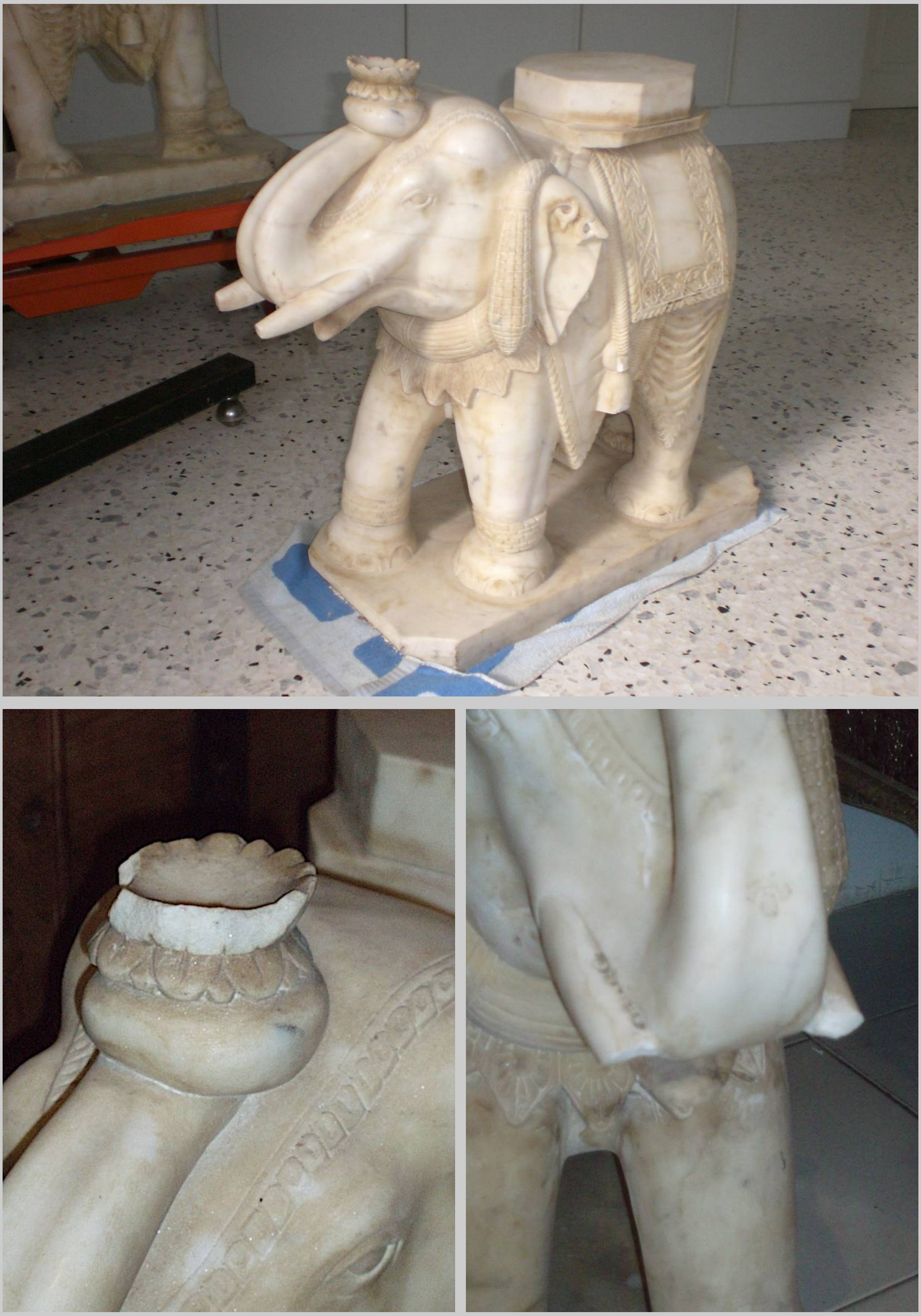
Head of Shiva (lingakosha) late 9th–10th century Vietnam (Champa, probably Quang Nam Province), Height 12 cm.

The head was silver fire gilded. The plate in the back broke and had to be reattached. A two component polymer was used to join the fragment. The missing areas in the fracture were filed with a mixture of solvent based polymer mixed with calcium carbonate. After levelling the new adit filler was colour matched using acrylic paint.

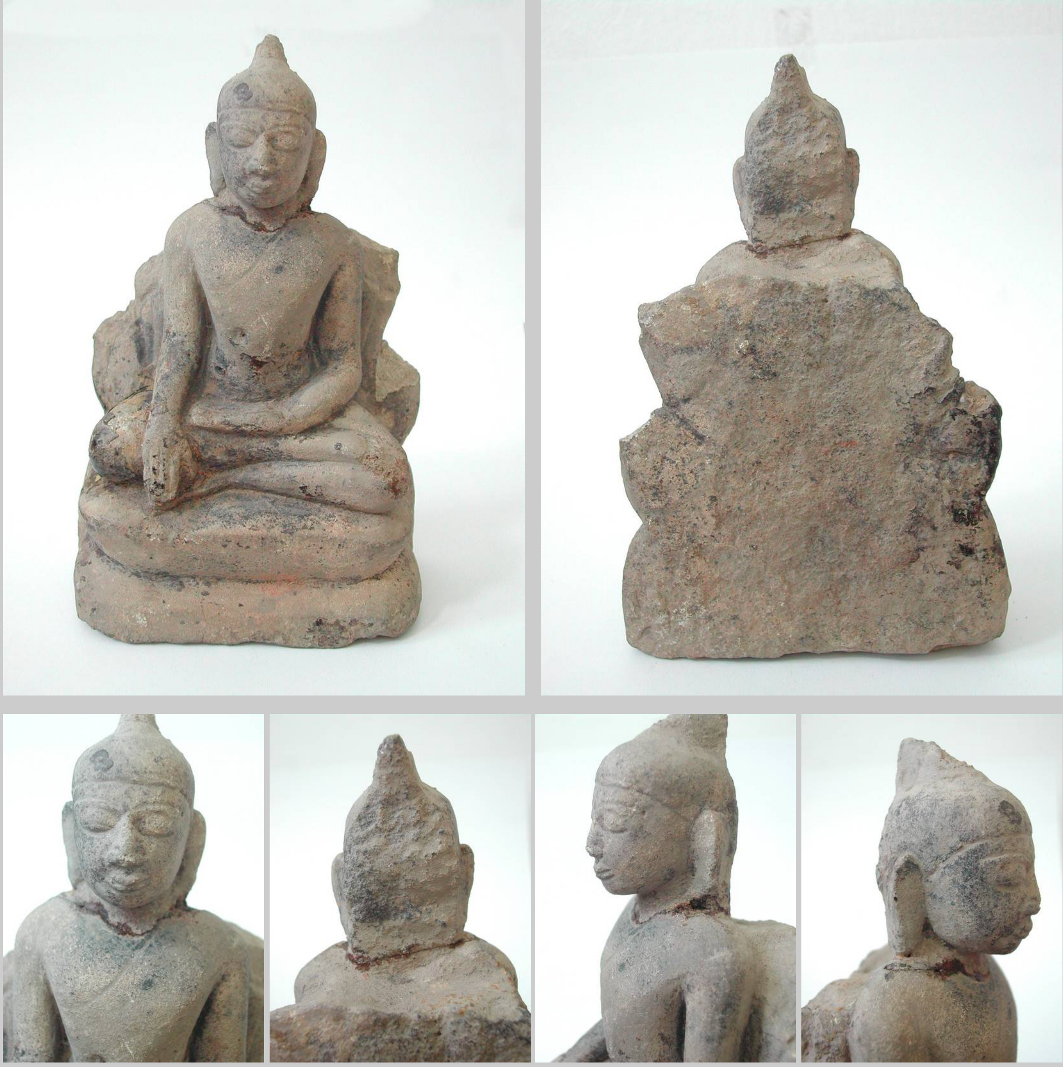
# Stone



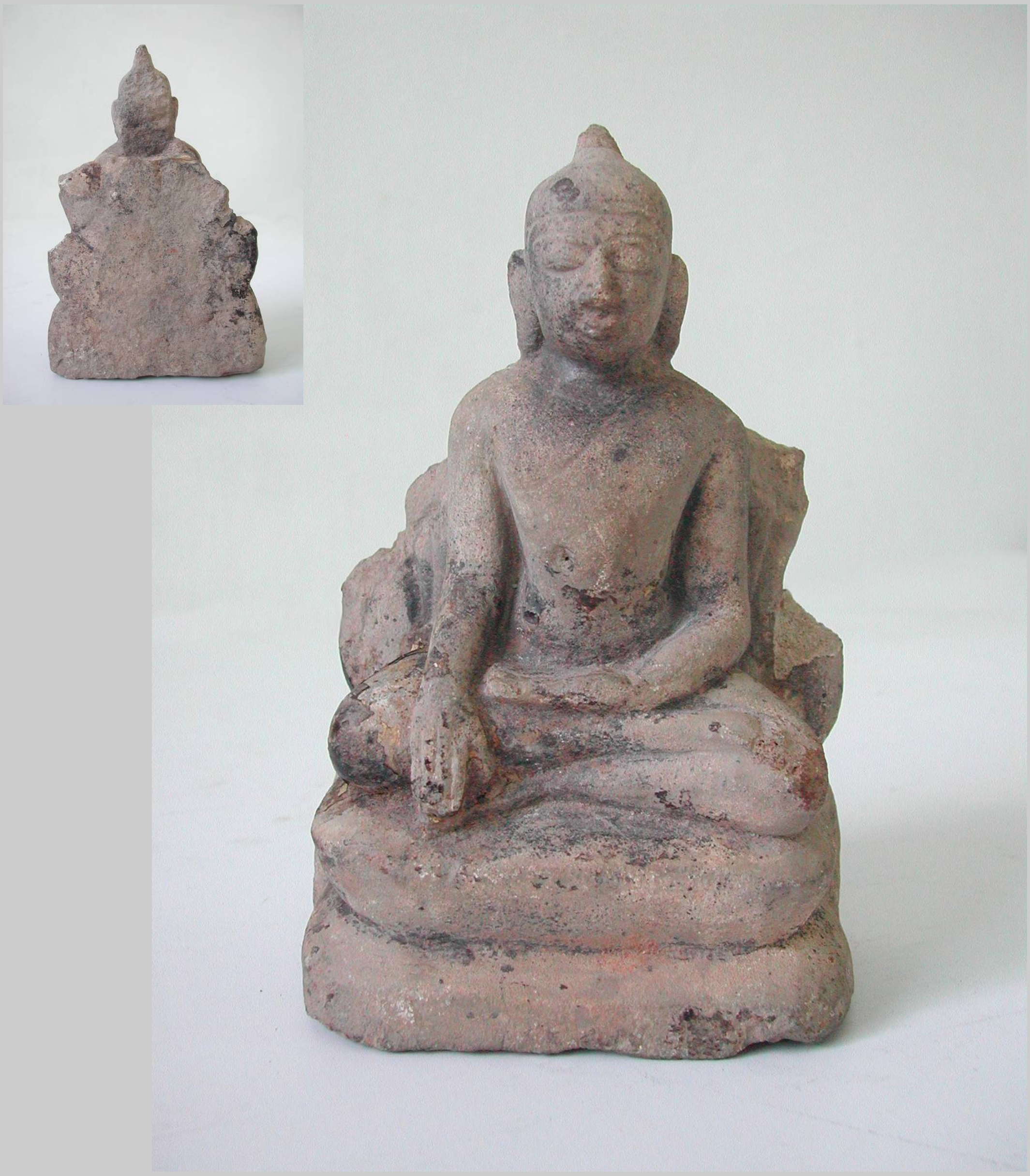
1st of a pair of Indian decorative marble elephants (19th century). The elephant was previously restored and is stained in modern times. The restoration is heavily discoloured. All discolourations were removed and the restoration properly retouched with a mineral filler and mineral paints.



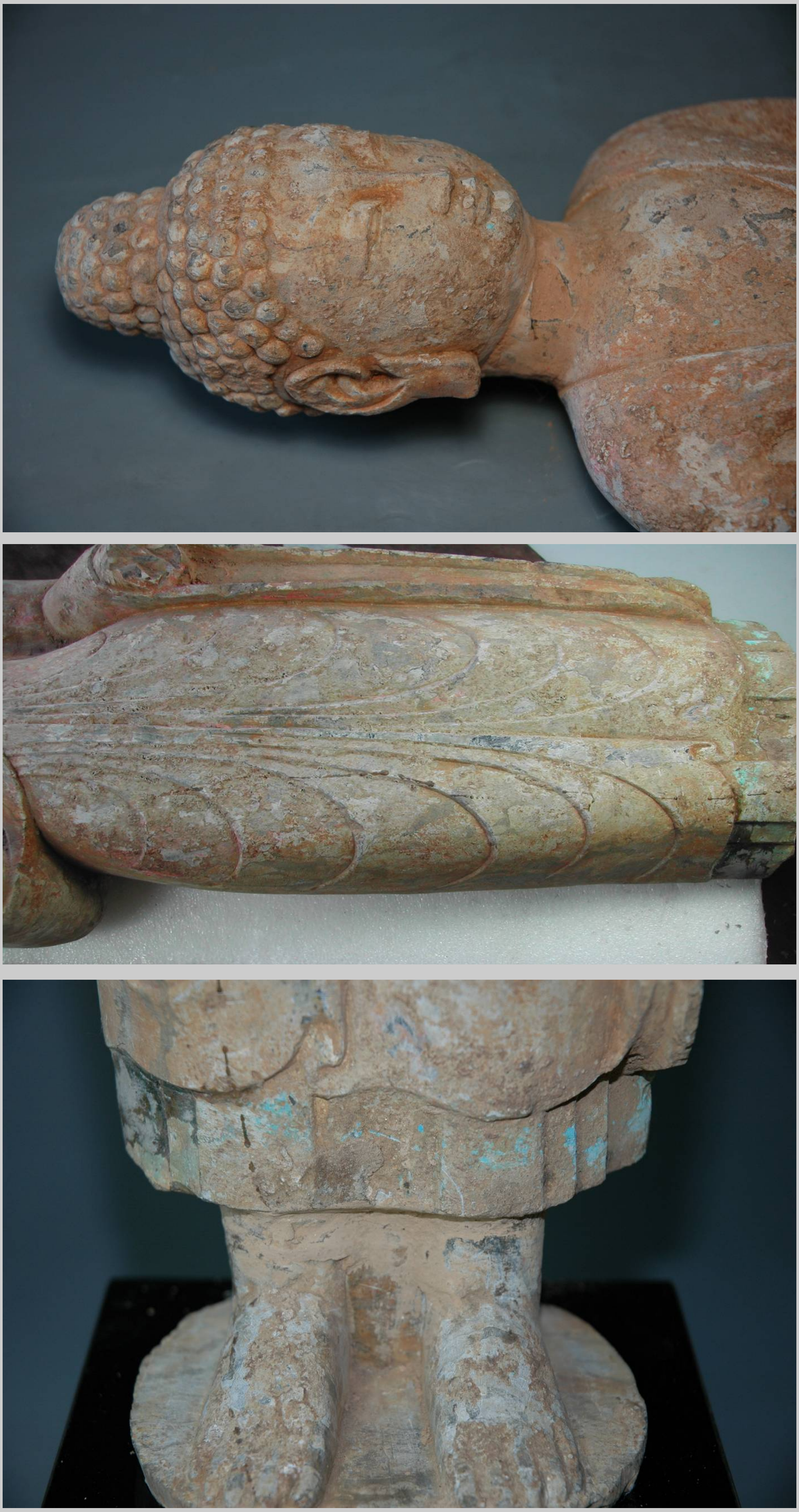
2nd of a pair of decorative Indian marble elephants (19th Century). Both tusks and the finial on top of the trunk were damaged and needed to be restored. The missing parts were reconstructed using mineral powder and synthetic binder. The surfaces were colour-matched with mineral pigments. A reversible clear coat was applied to the restored areas to protect from wear and tear.



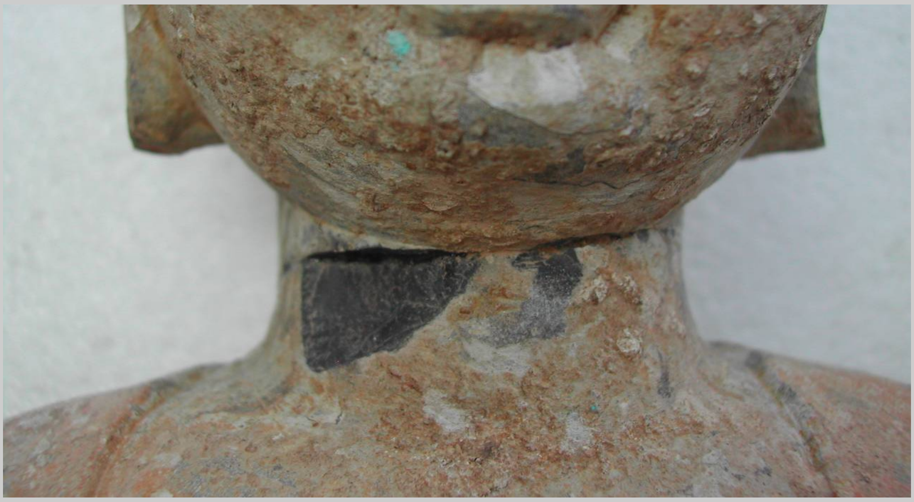
Small sandstone seating Mon Buddha Myanmar. The head was fractured at the neck and needed a professional restoration-conservation. The old adhesive was removed with solvent, the head attached with a polymer and the missing fracture elements replaced with a filler and colour matched.

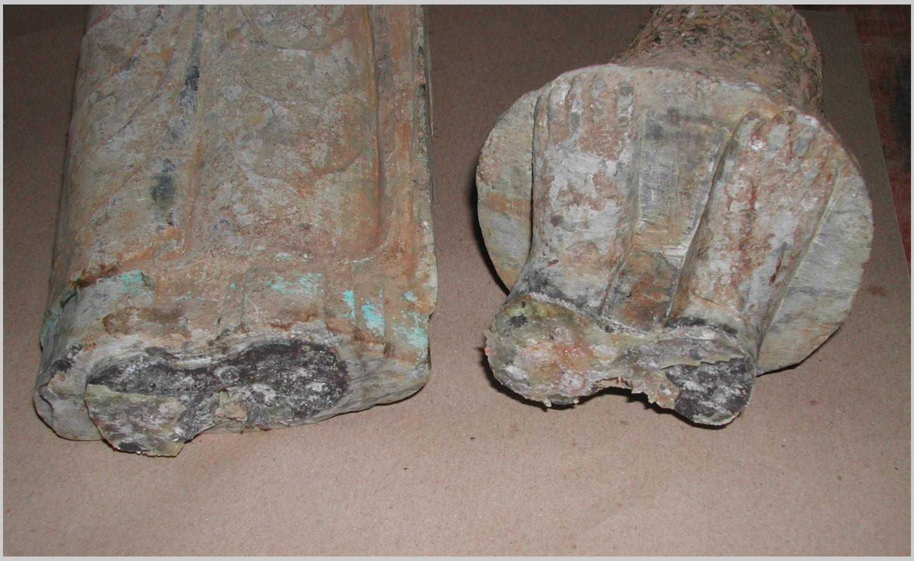


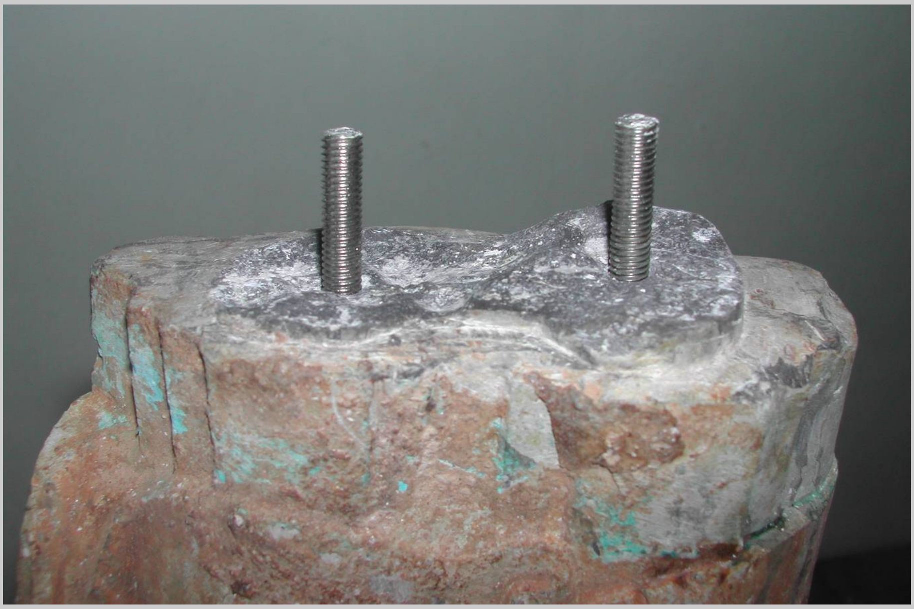
Seated sandstone Buddha after conservation – restoration.



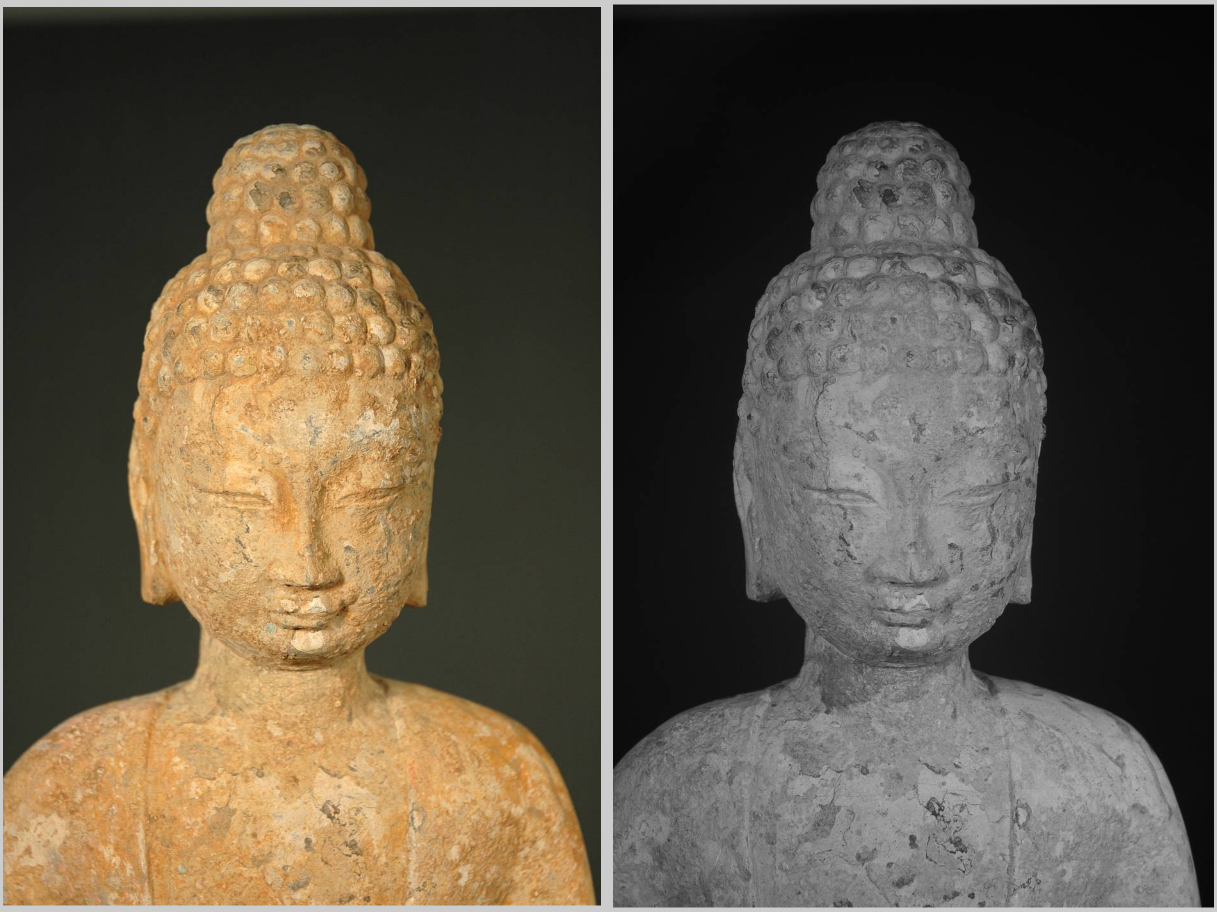
Stone Standing Northern Qi style (550 – 577 CE). The sculpture is fractured at the neck and above the ankles. The restoration was unsatisfactory and masked with soil. Various areas are covered with polymer resin that was used to join the fragments.



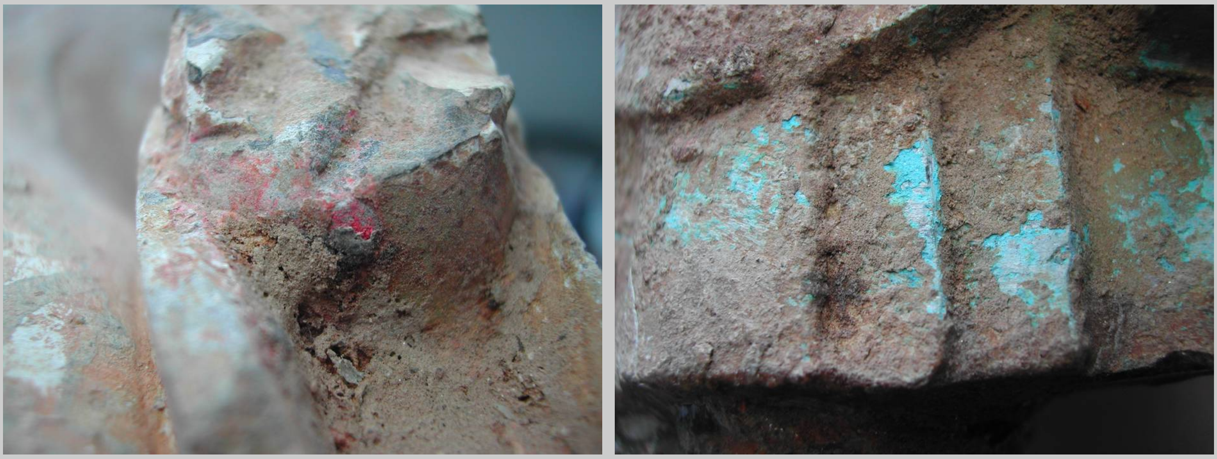




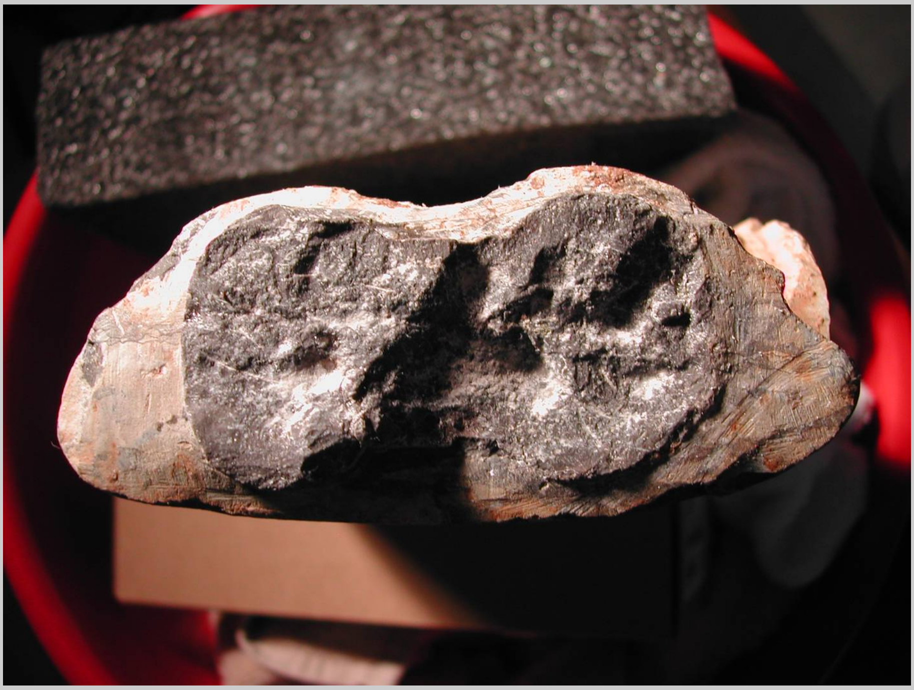
The fracture in the neck and above the ankles was thoroughly cleaned from old adhesive and restoration. Two stainless-steel dowels were inserted and secured with two component polymer and filler. The previous restoration failed due to the lack of reinforcement.



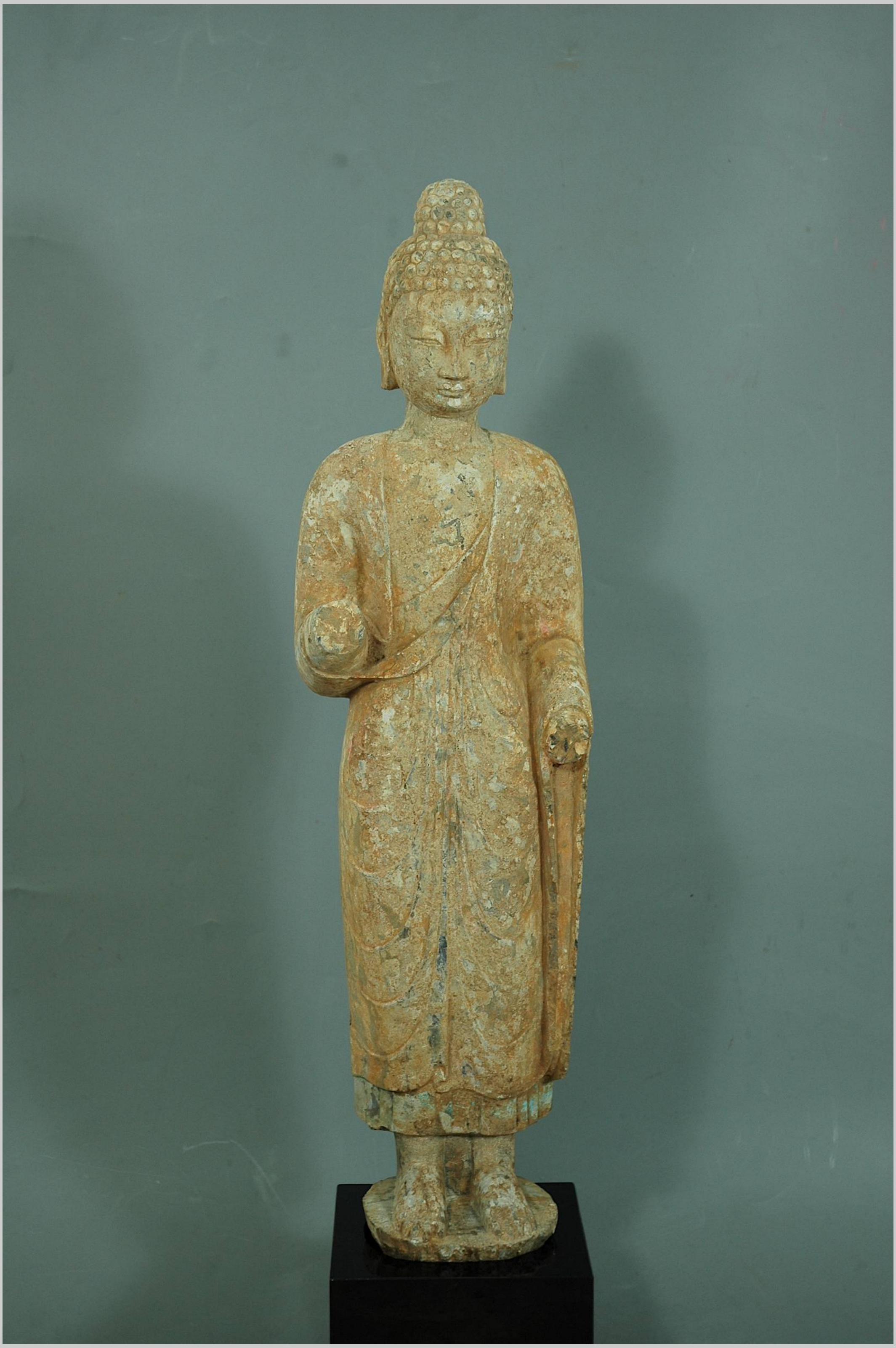
Neck fracture after treatment. Infrared photography on the right clearly shows the new restoration and will clarify any ambiguity.



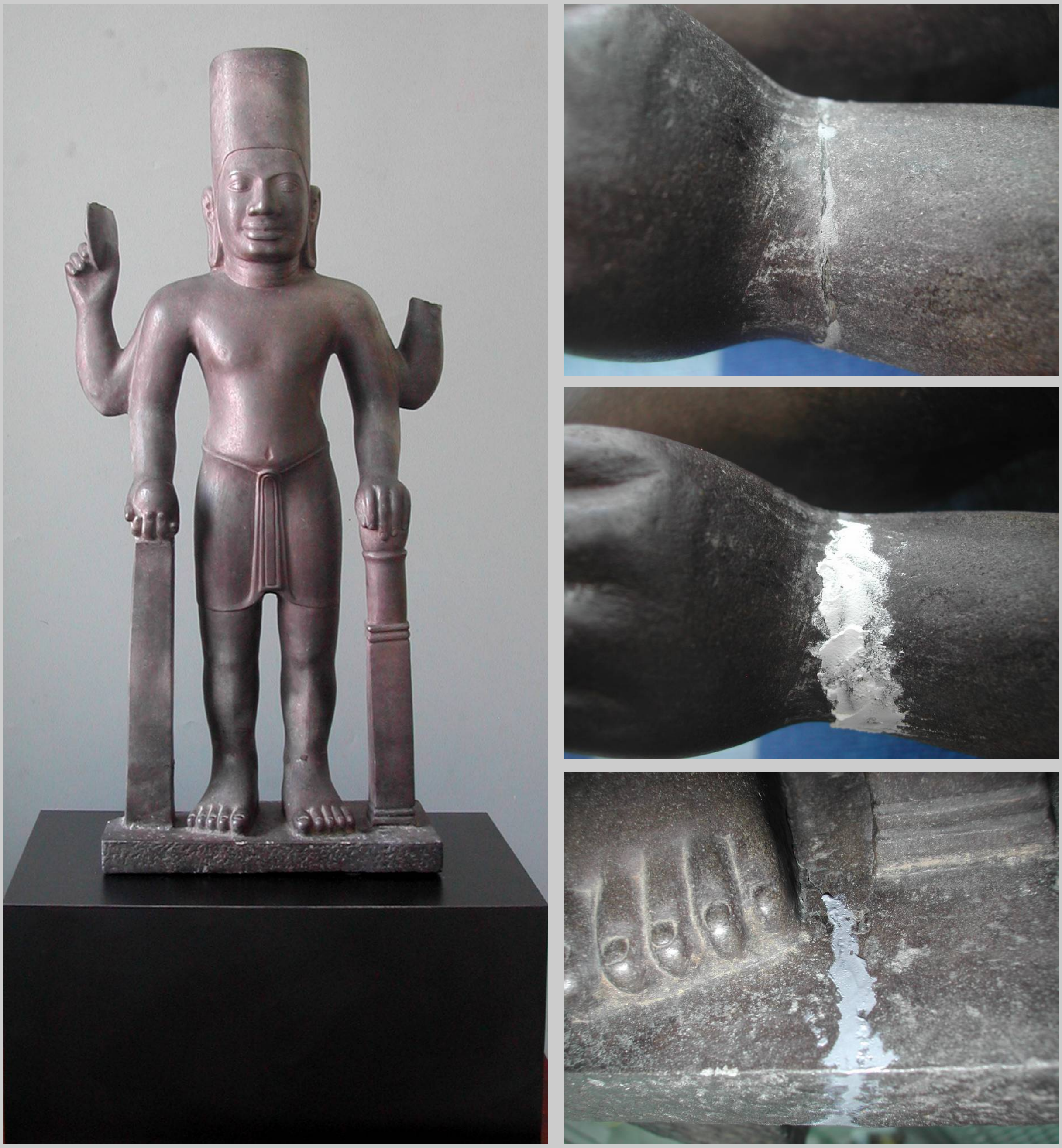
In various areas red and turquoise pigments were detected. These were covered by soil deposits.



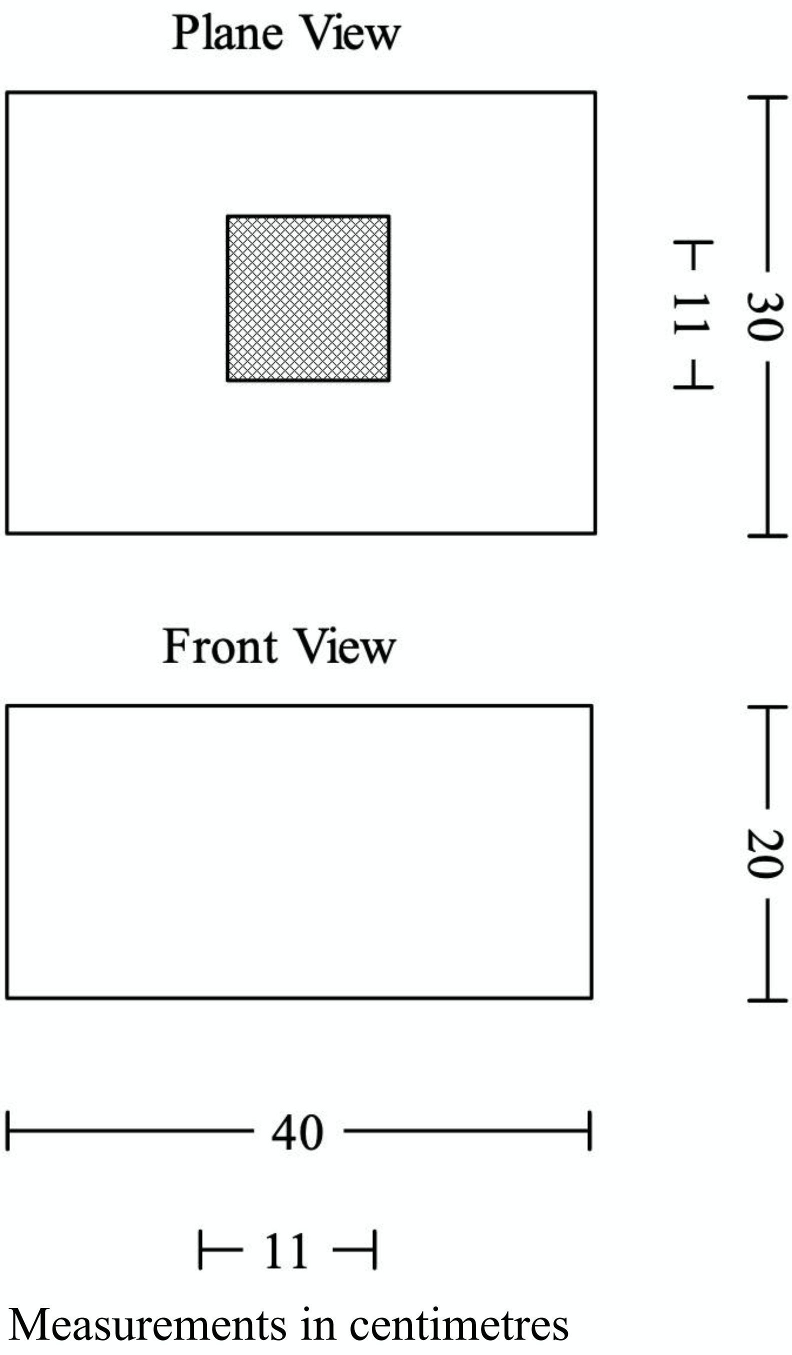
On the underside of the robe the tool-marks normally not visible, but due to the fracture exposed, have a resemblance of angle grinder marks. These are usually used to carve modern replicas.

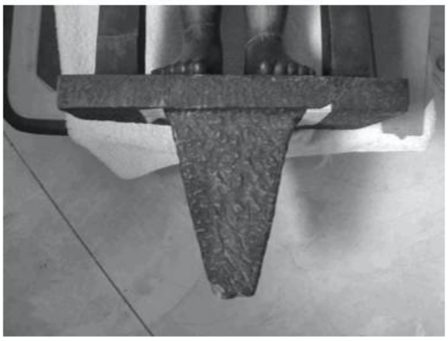


The Northern Wei Stone Buddha after treatment on its new purpose build wooden base.

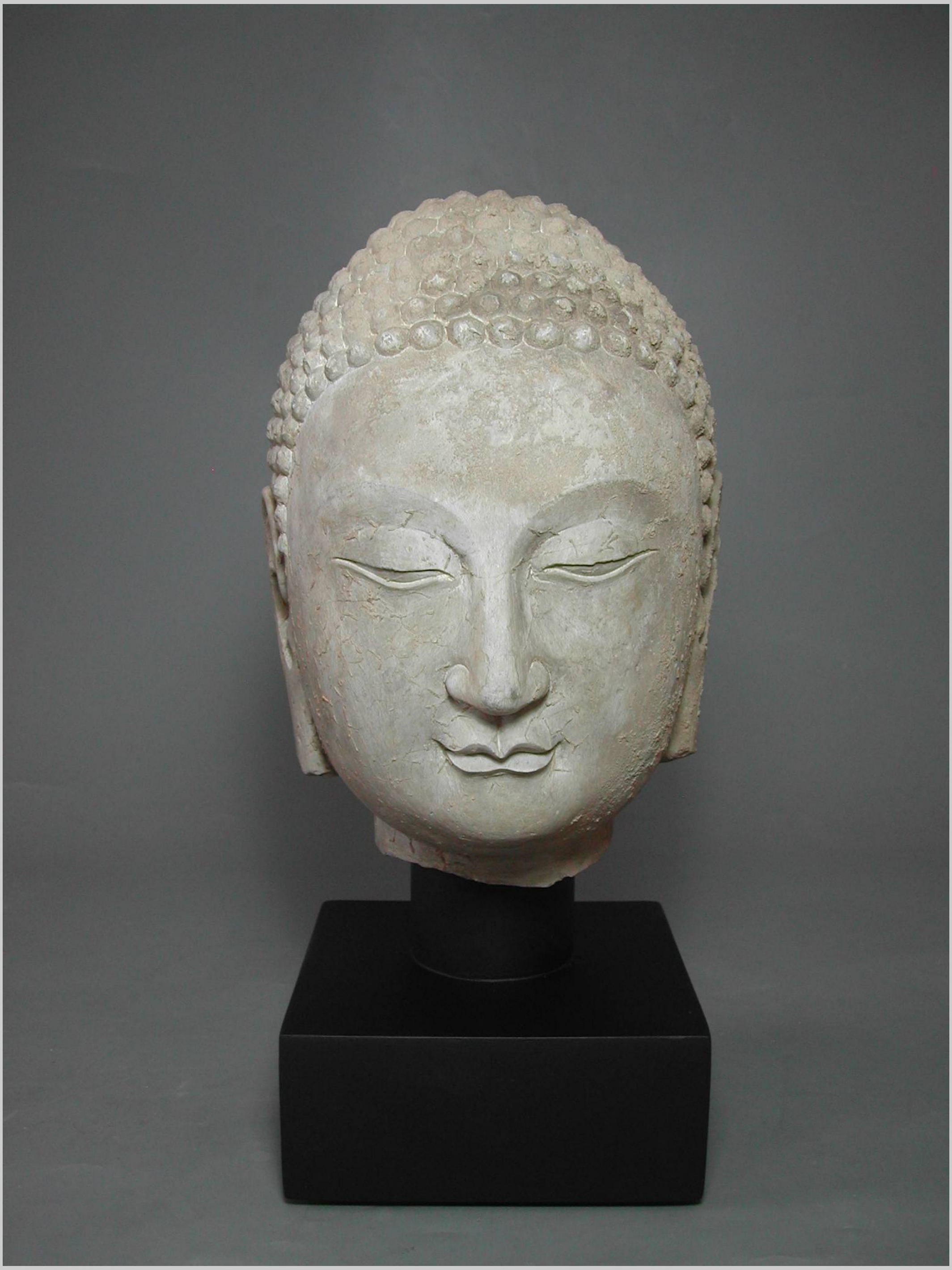


Khmer grey stone sculpture, ca 700 CE. The figure has been previously restored and needed retouching. The fractures were cleaned and filled with calcium filler and retouched with acrylic colours. The sculpture needed an appropriate and secure stand.



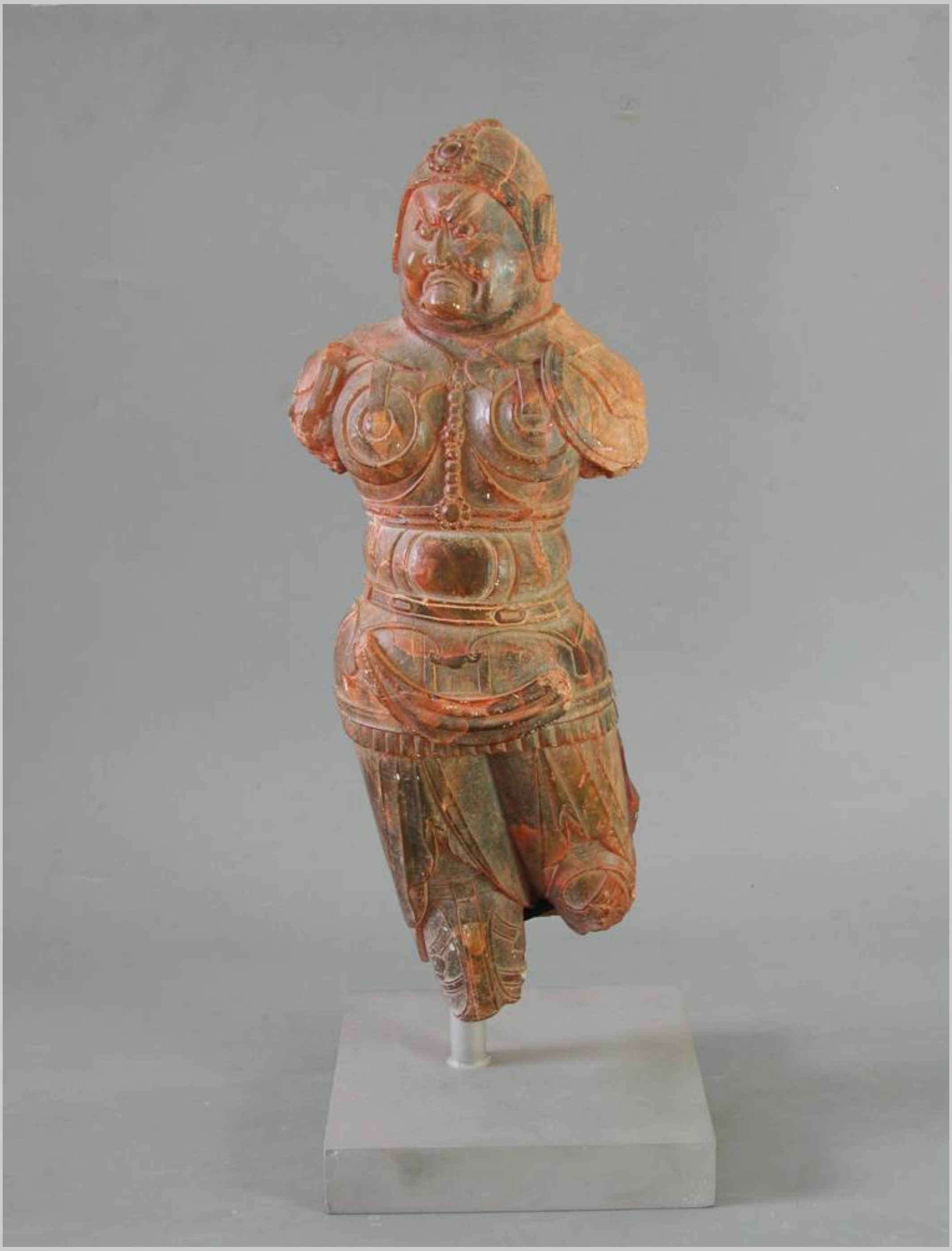


The plinth was created in marine plywood. The centre had a sleeve that matched the pin on the underside of the sculpture. The plywood was laminated with matte-black Melamine. This is easily maintained, solvent and scratch resistant.

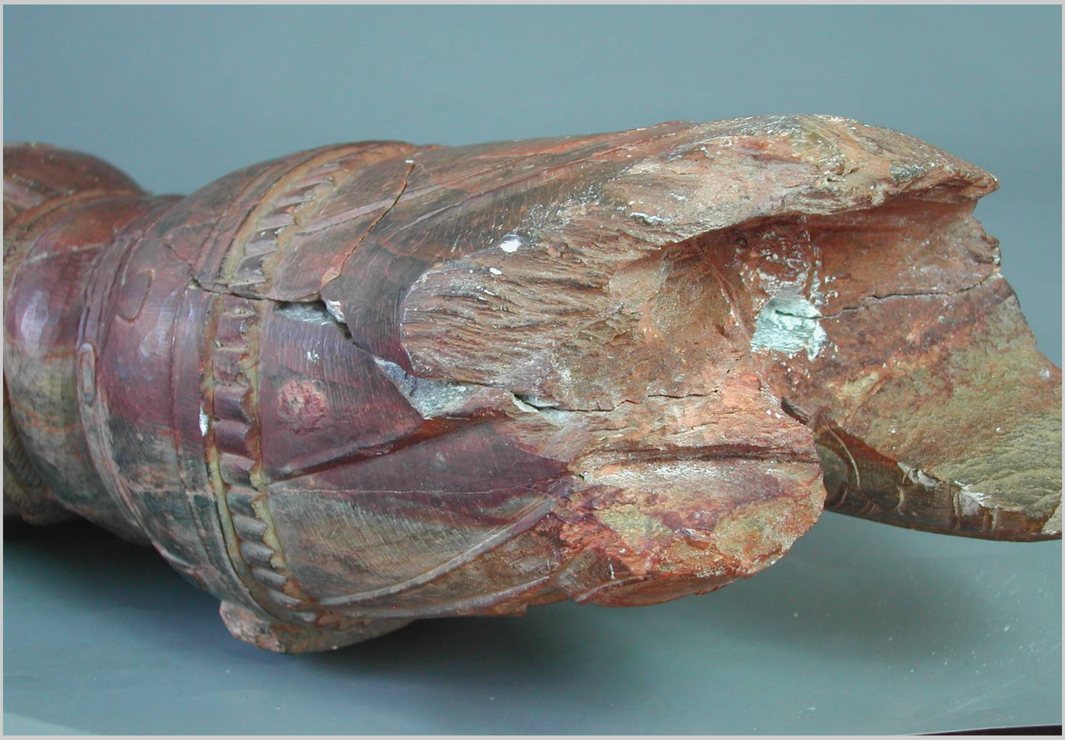


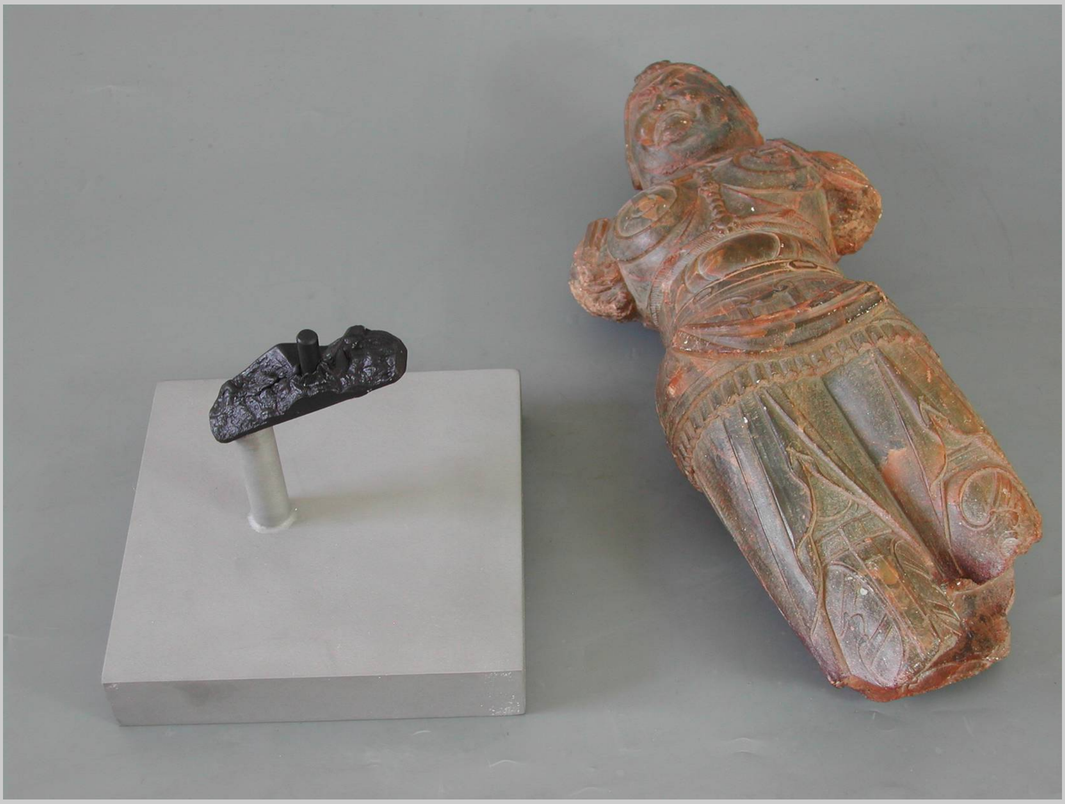
Gray Stone Buddha Head Shandong, Northern Qi.

The client requested a mount for the head. The base of the neck had a small hole in the centre. It was decided to use this hole and avoid mounting the head on a spike as it is common practice in collections. An imprint of the fracture was taken and a resin base cast. A pin was inserted in the new cast and secured. This was then glued to a wooden square base. The mount was coated with black matt synthetic paint. The head keys in with the base and the pin secures its position and it can be easily removed.



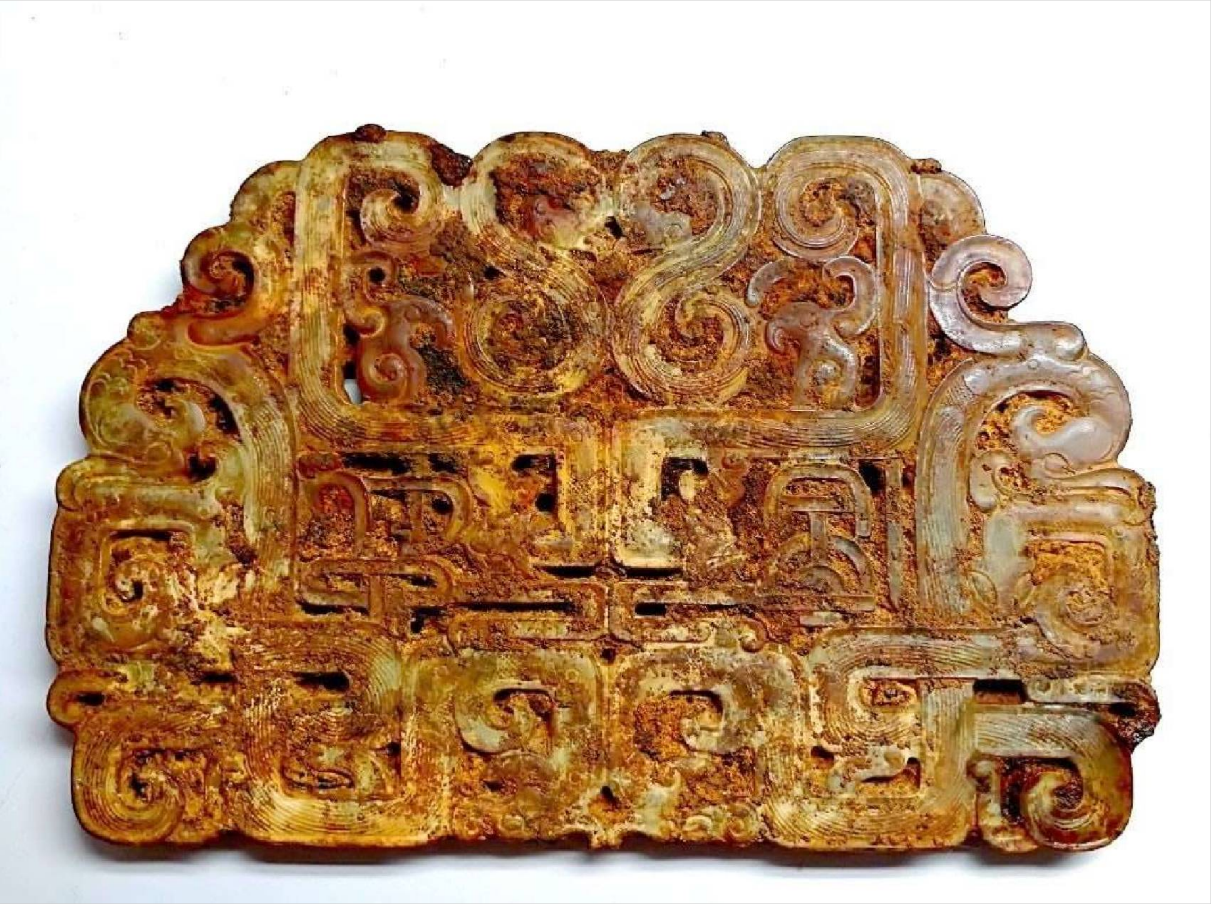
Tang Marble sculpture of Lokapala, 618 BCE - 907 BCE. The figure needed a mount for display.



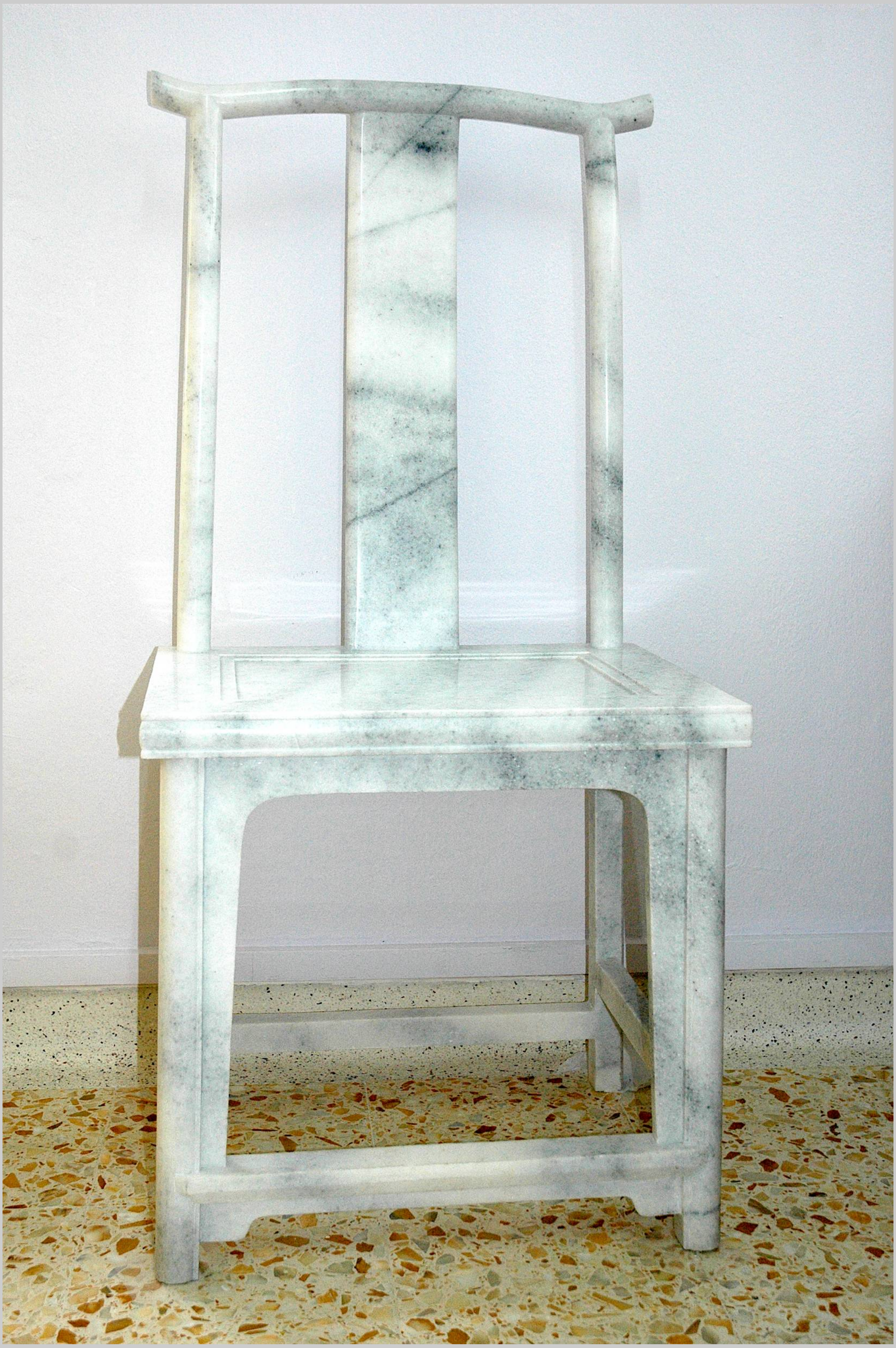


The bottom of the sculpture had a recently drilled hole. The cracks in the sculpture, suggest that the previous drilling caused the sculpture to fracture.

A new stainles steel mount was designed that accounted for the hole and would add support to the fractured base, to spread the weight more evenly and remove major stress to the existing hole.

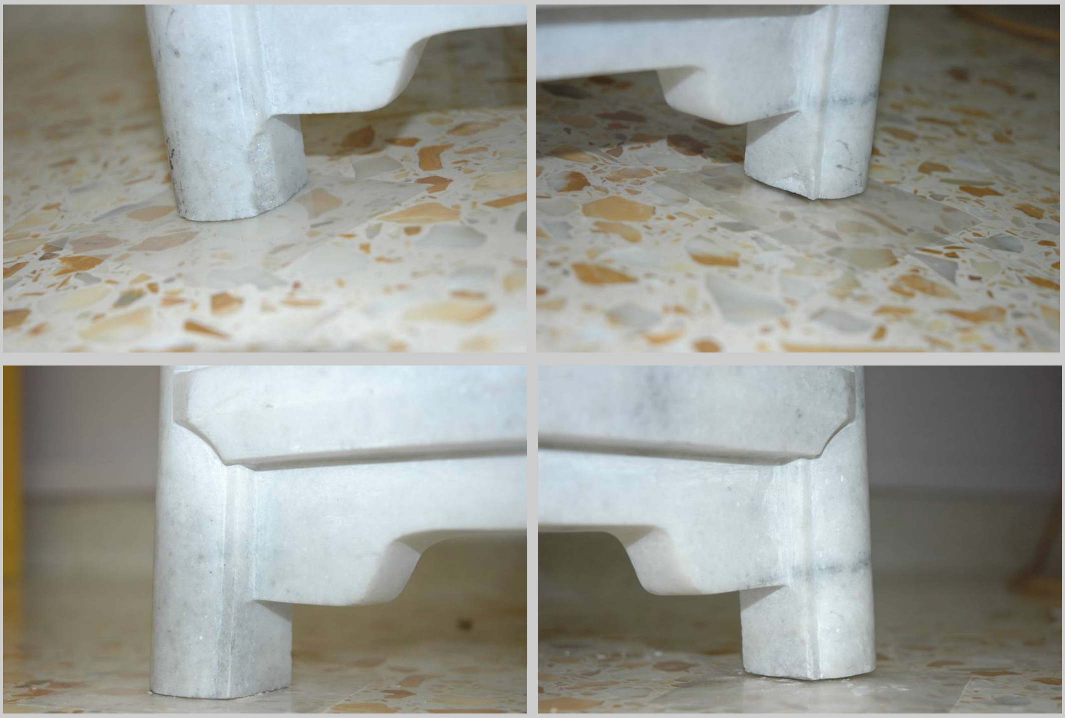


Antique Chinese Jade (probably Nephrite) pendant. The incrustations contain silica and are incredibly hard. The cleaning of the surface would have risked the damage of the artefact, so the client wanted to postpone the conservation after the initial testing by mechanical cleaning and with various complexing agents.



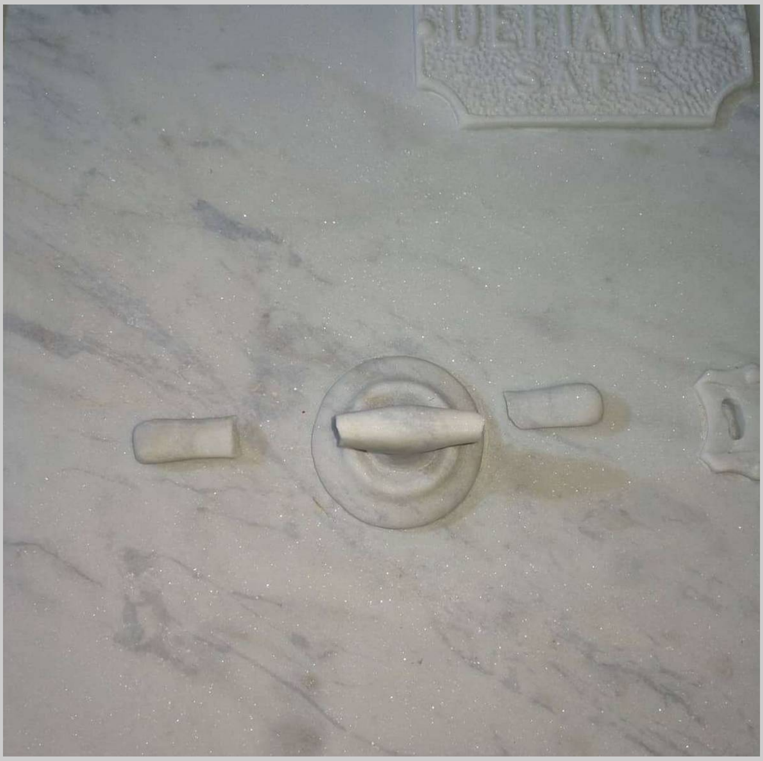
Ai Weiwei, “Marble Chair” 2008.

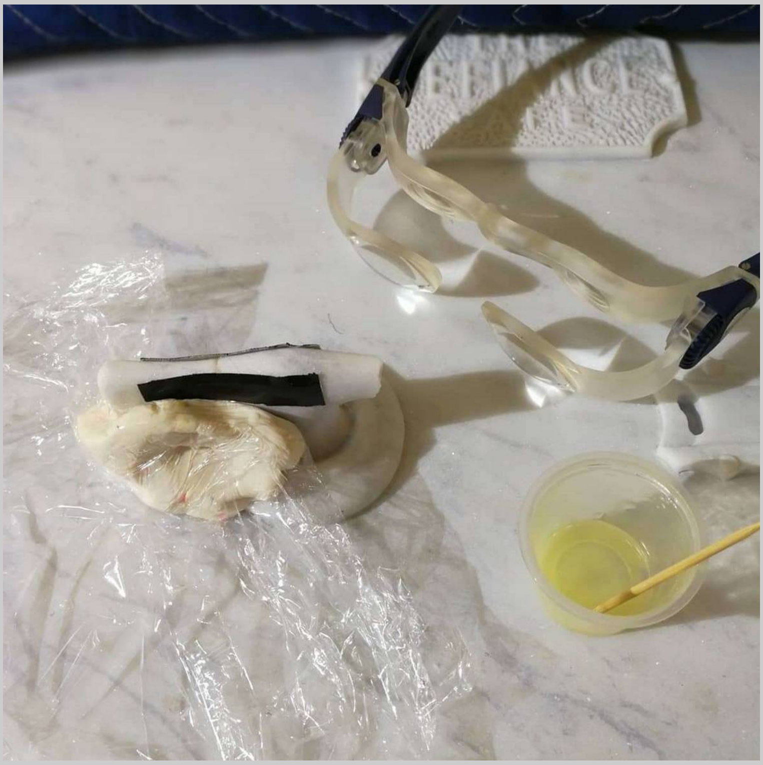
The sculpture was in stable condition. There was some minor chipping on the inside of the bottom of the front legs and one of the back legs. There are paint splatters on the surface of the marble. The damage occurred when a visiter was sitting on the chair. Due to the brittle nature of the crystalline marble, the bottom of the legs were easily damaged when the pressure to the edges changed. An shock absorbing material such as polyethylene should be added under the legs.



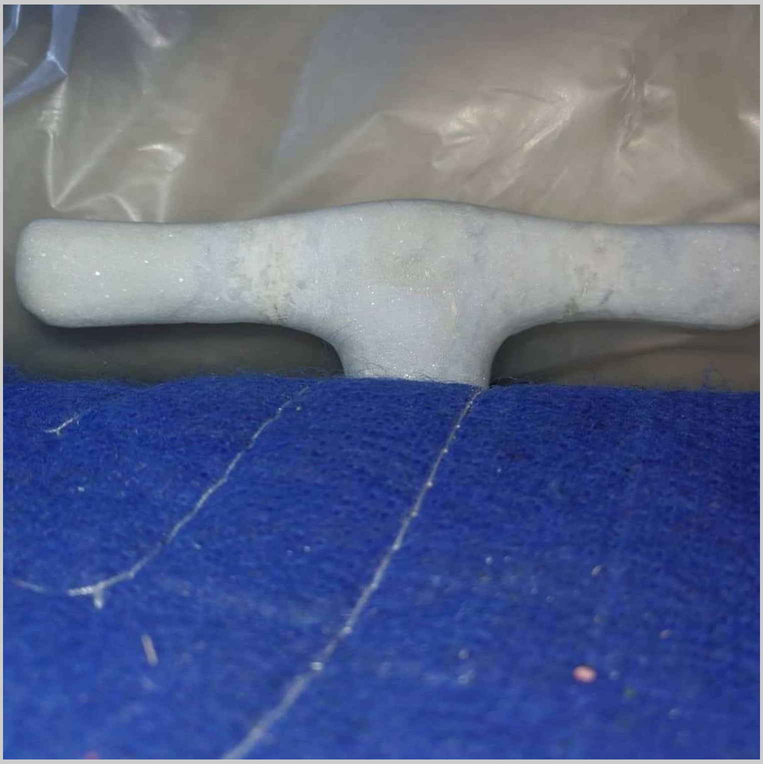
The surface of the marble was cleaned with a solvent to remove the paint splatters. The damaged edges of the legs were restored using a calcium carbonate based synthetic resin filler. The fill was colour matched using acrylic paint and protected with an acrylic varnish.

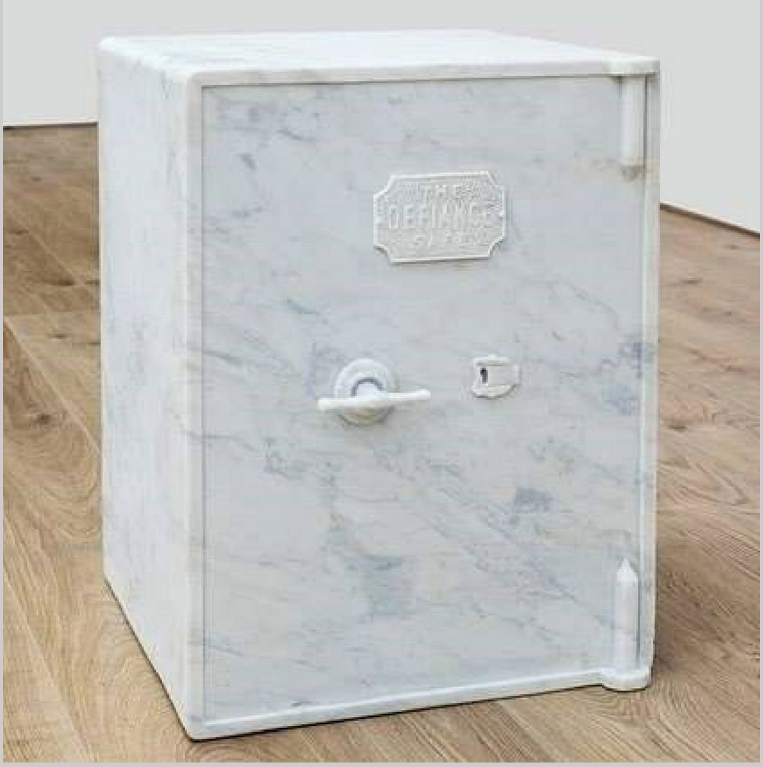
There were also some minute scratches on the proper right hind leg and the cross bar. These were retouched using acrylic paint and clear lacquer. The restoration is in line with museum conservation methodologies and completely reversible.



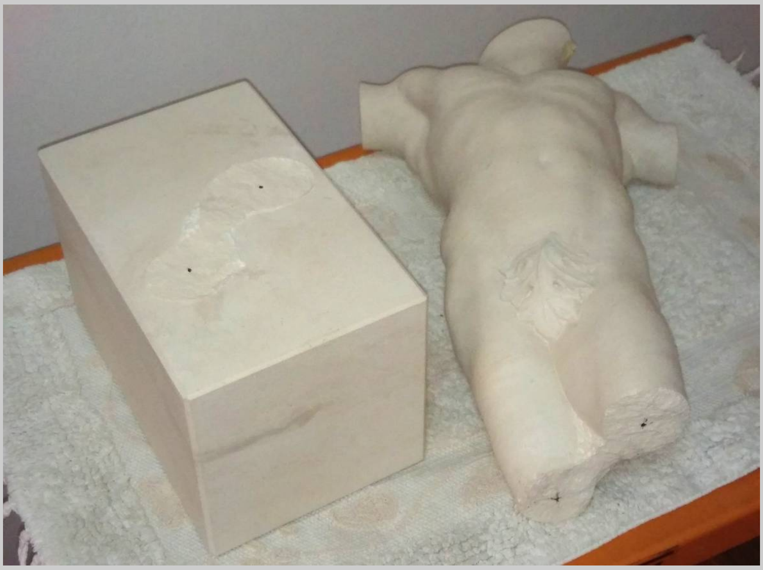


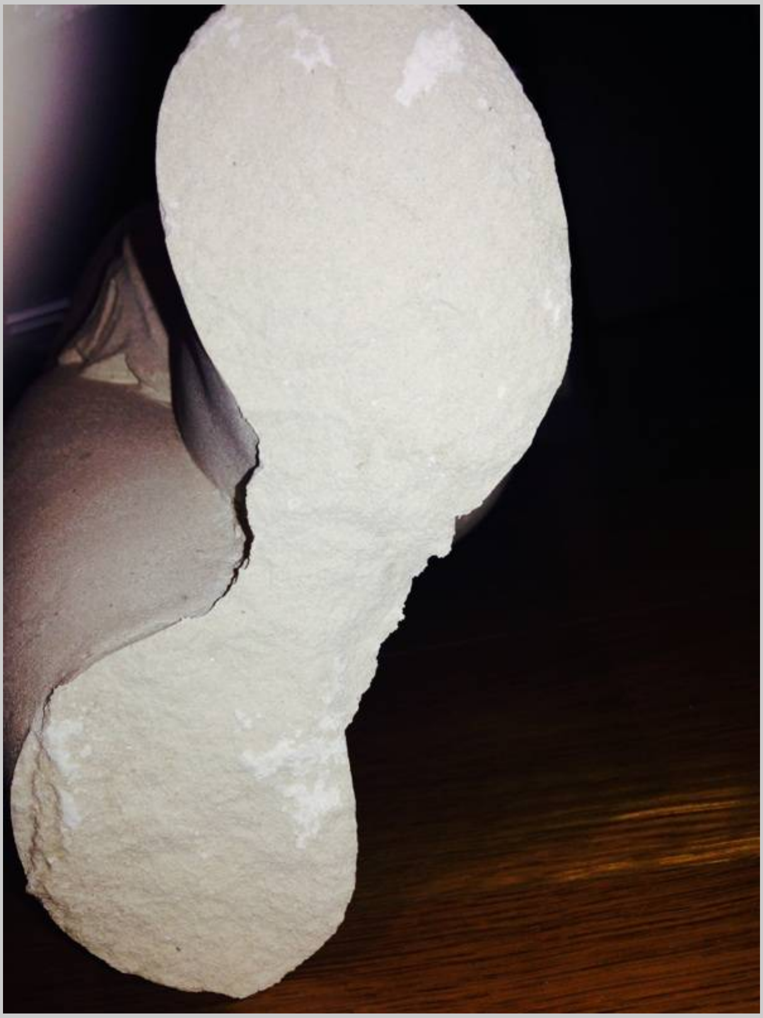
The handle of this marble sculpture was fractured in two places. The fragments were not dowled, since the fracture was fragile and not broad enough. A two component synthetic resin was used to join the pieces together. During the curing process the fragments were held in place by putty and masking tape.



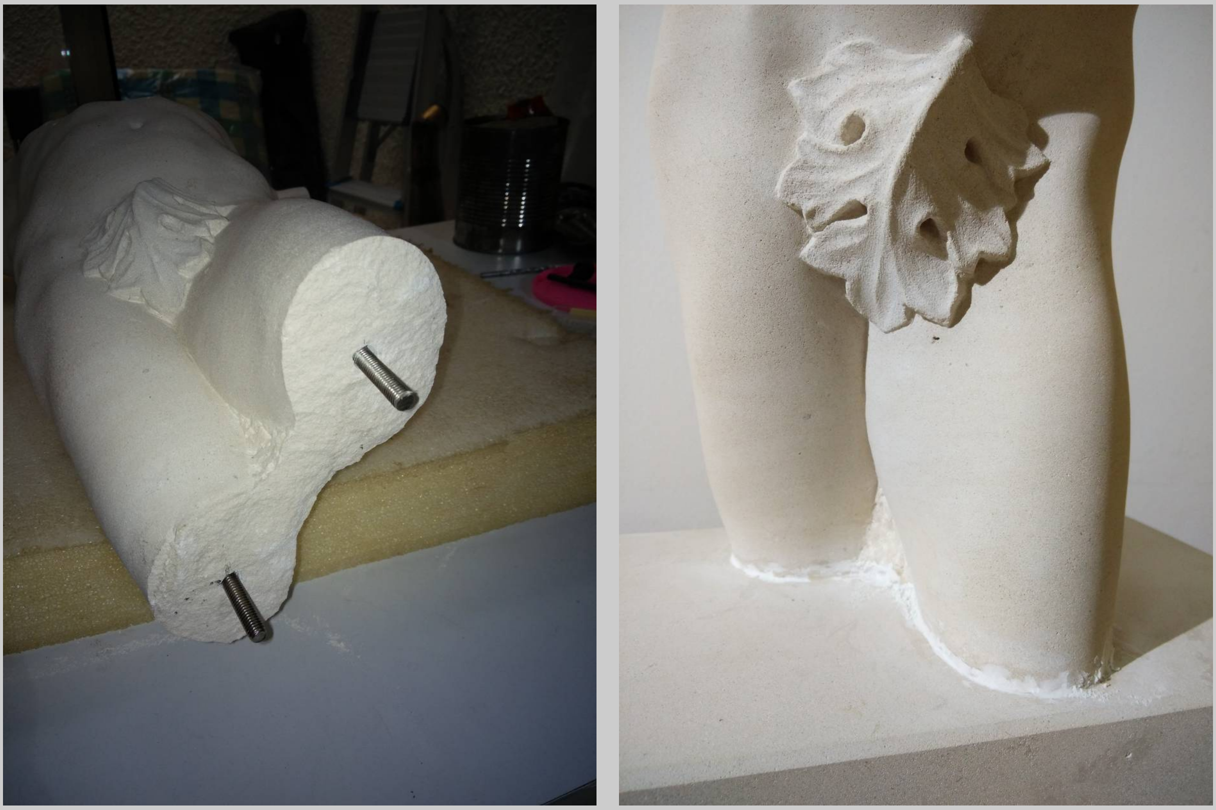


After joining the pieces the gaps between the fragments, due to the missing fractured edges, was filled with a calcium carbonate polymer filler. The filler was colour matched with acrylic colours. The conservation treatment is completely reversible.

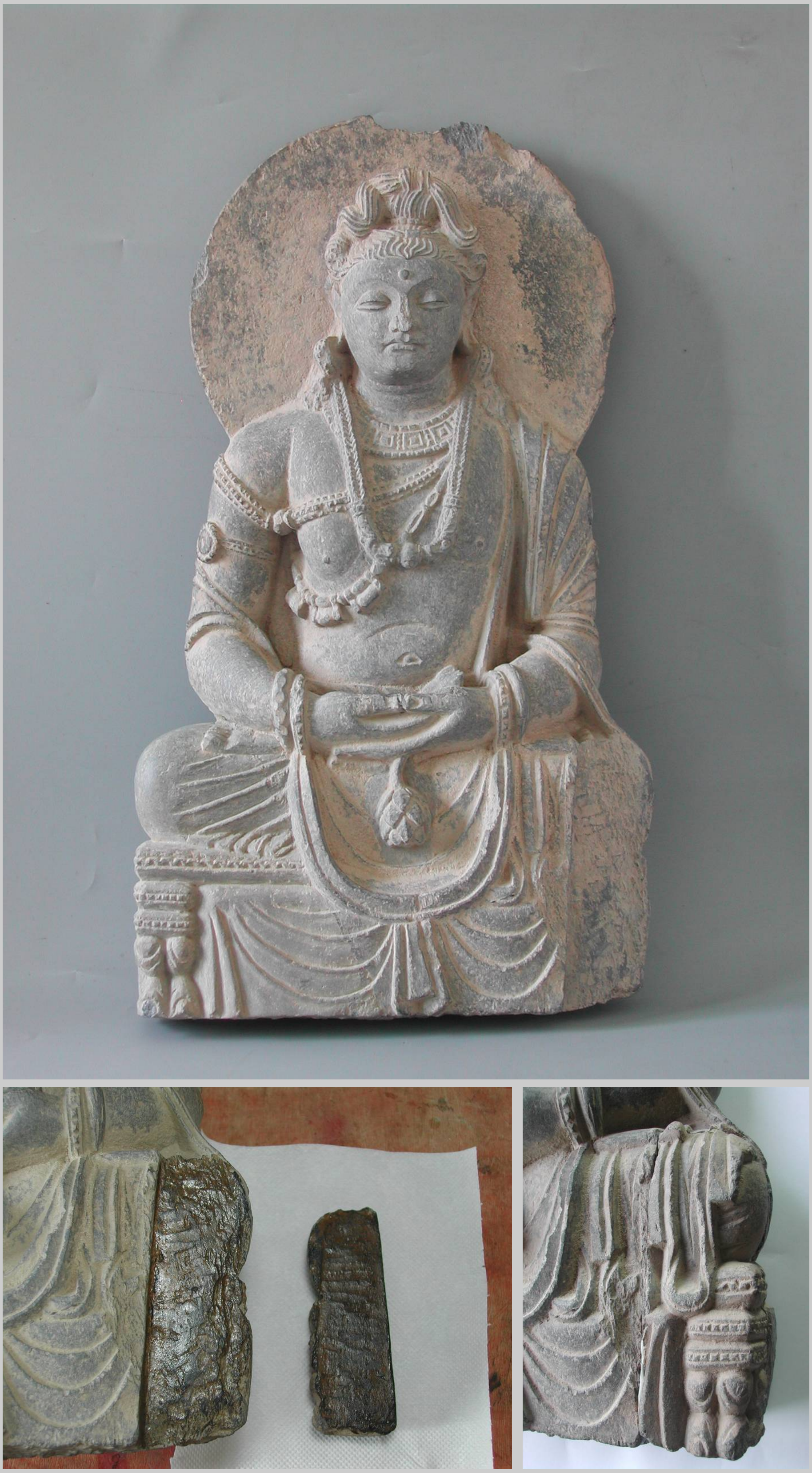




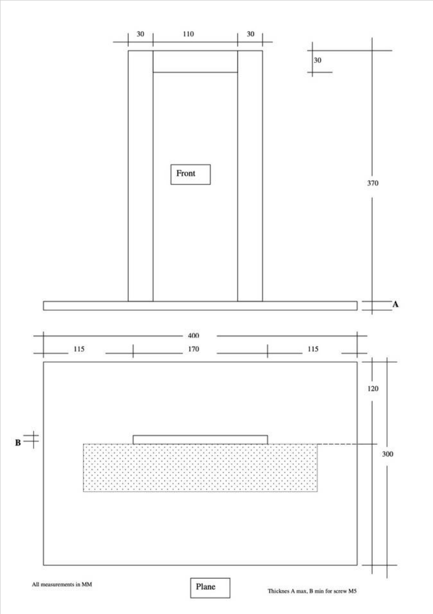
Fractured torso with the indication points for the two drill points for the stainless steel dowels. The fracture was fairly clean and there was no excessive loss at the edges. There was no earlier attempt of restoration so not much cleaning of the fracture was needed.

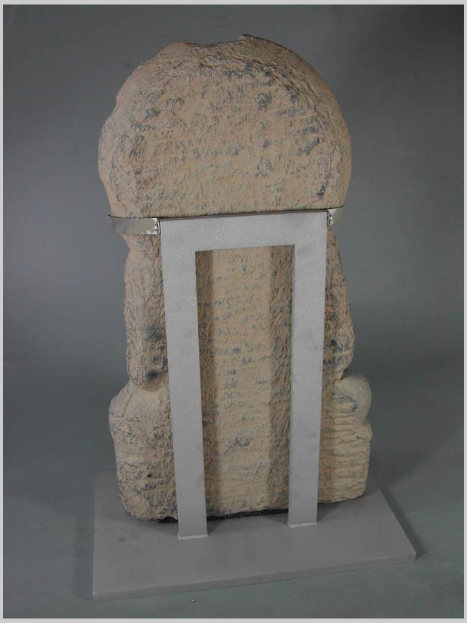


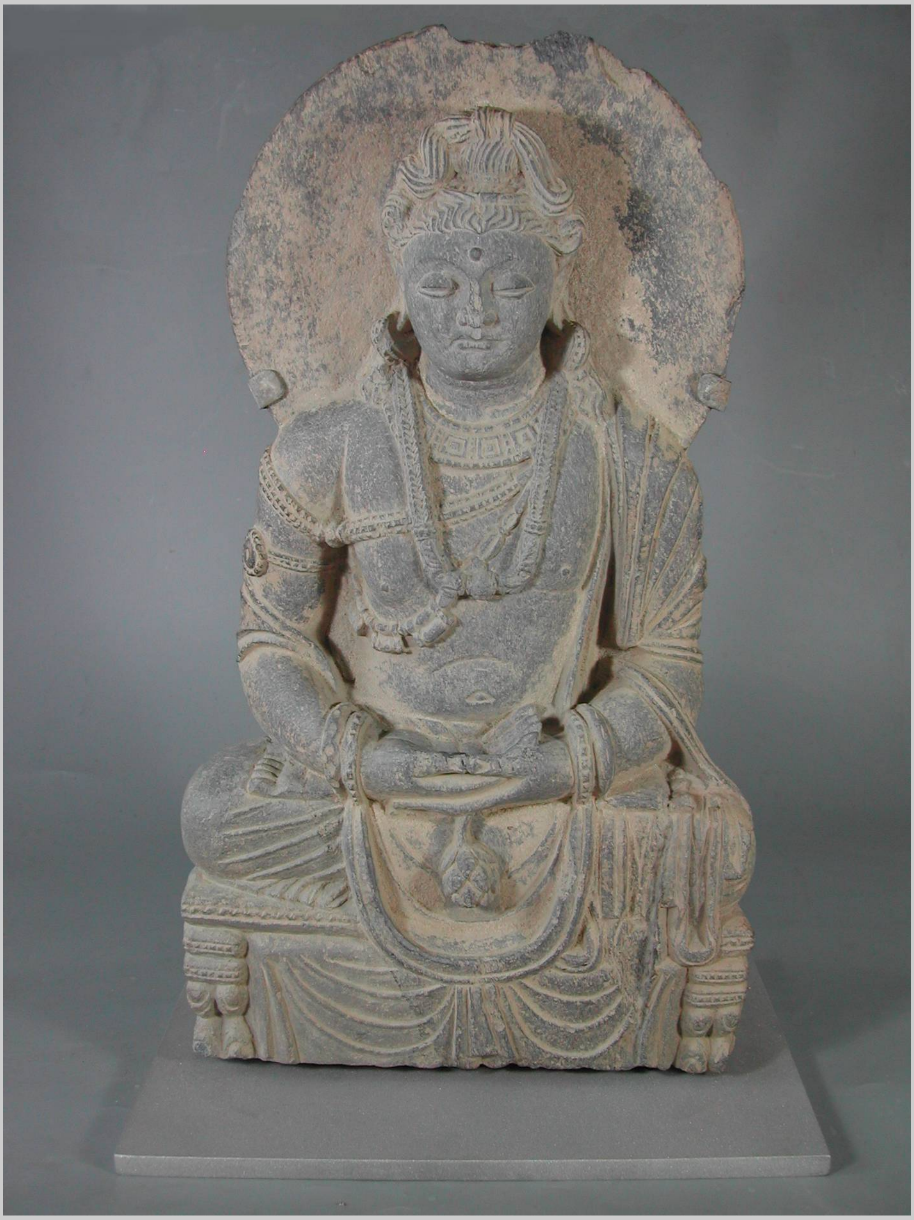
The dowel holes drilled and the stainless steel pins firmly inserted into the legs securing them with a two part synthetic resin.  After joining the base with the rest of the sculpture, the remaining small gap was filled with calcium carbonate filer, levelled and colour matched.



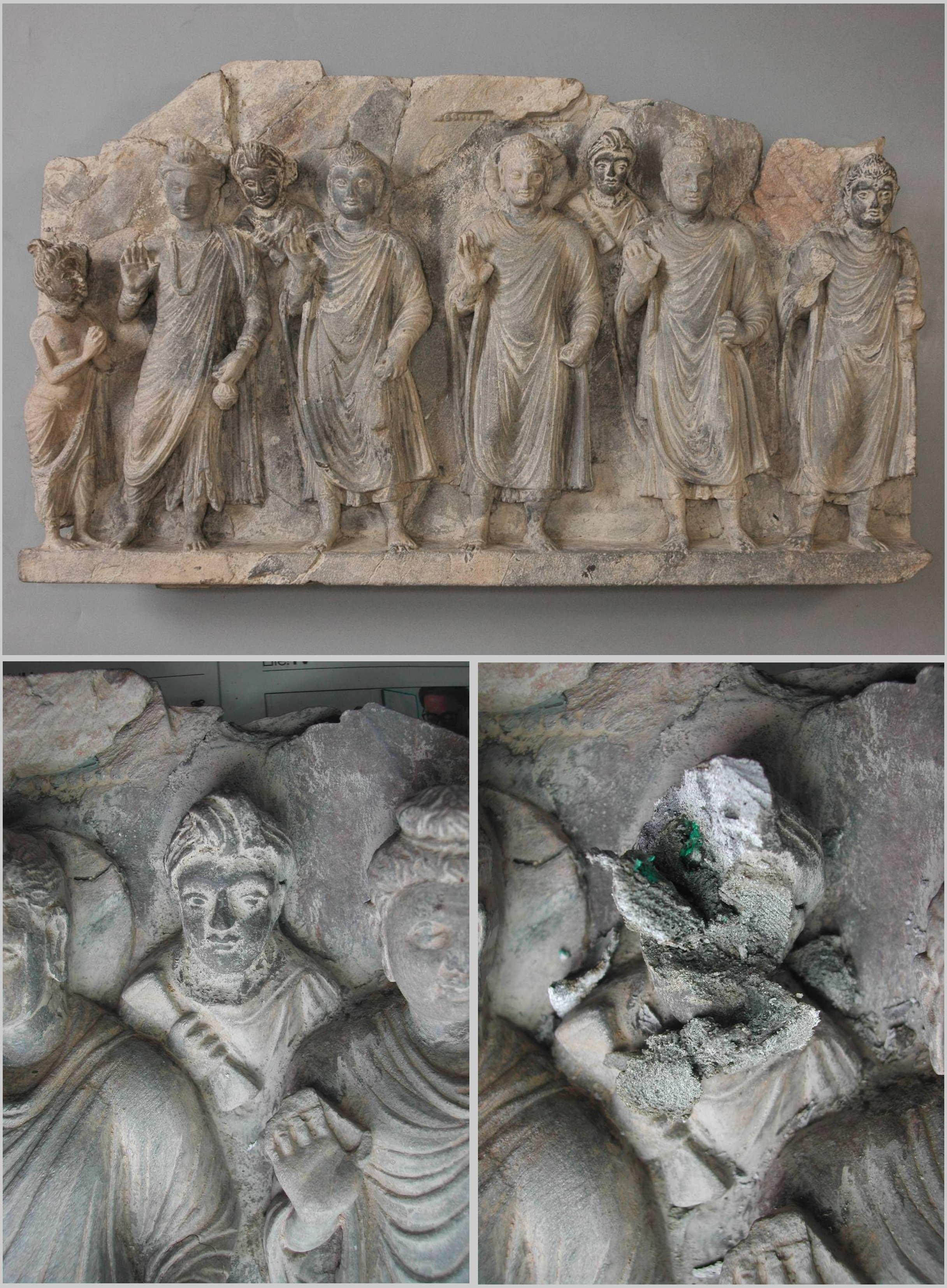
Grey schist stone Buddha, Gandhara 3-4th CE. The proper right knee and corner was broken off, probably remodeled in the past and needed to be joined back with the body of the sculpture. The piece was joined using two component polymer and retouched with gesso and acrylic colours.



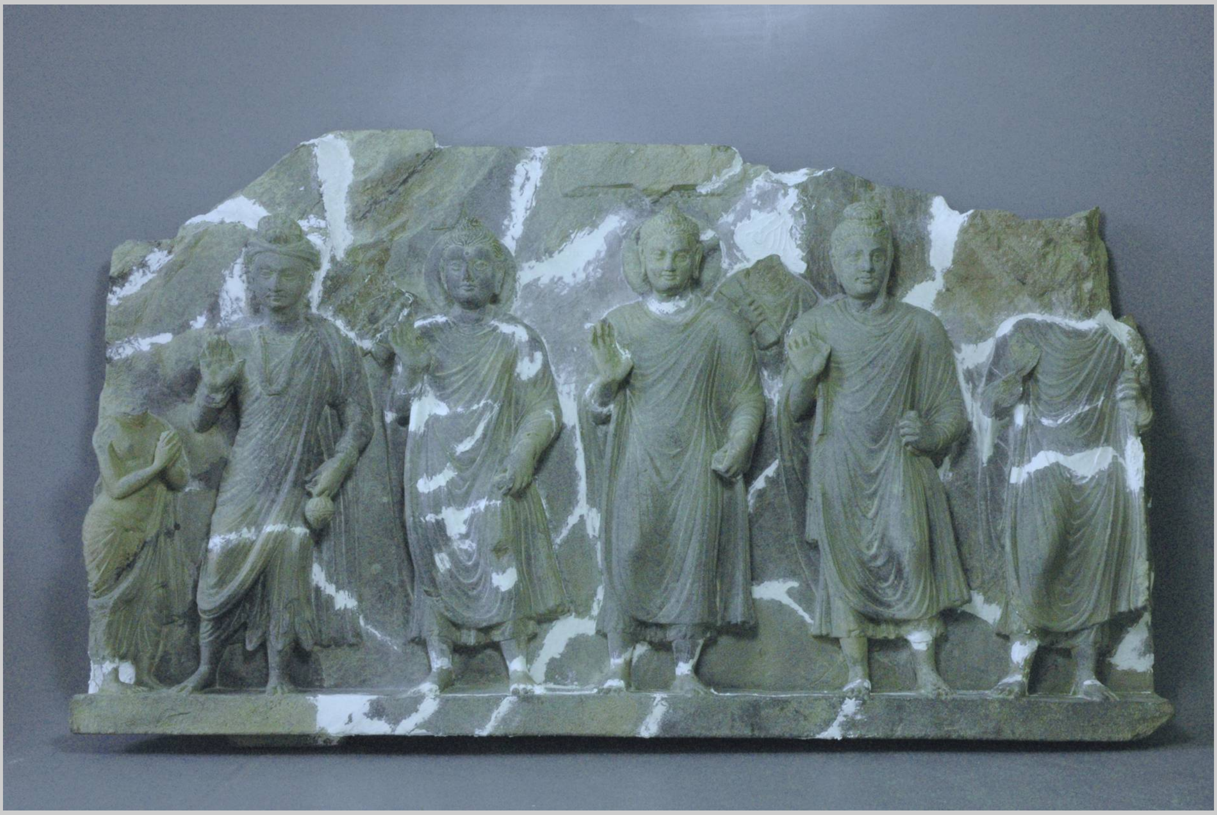


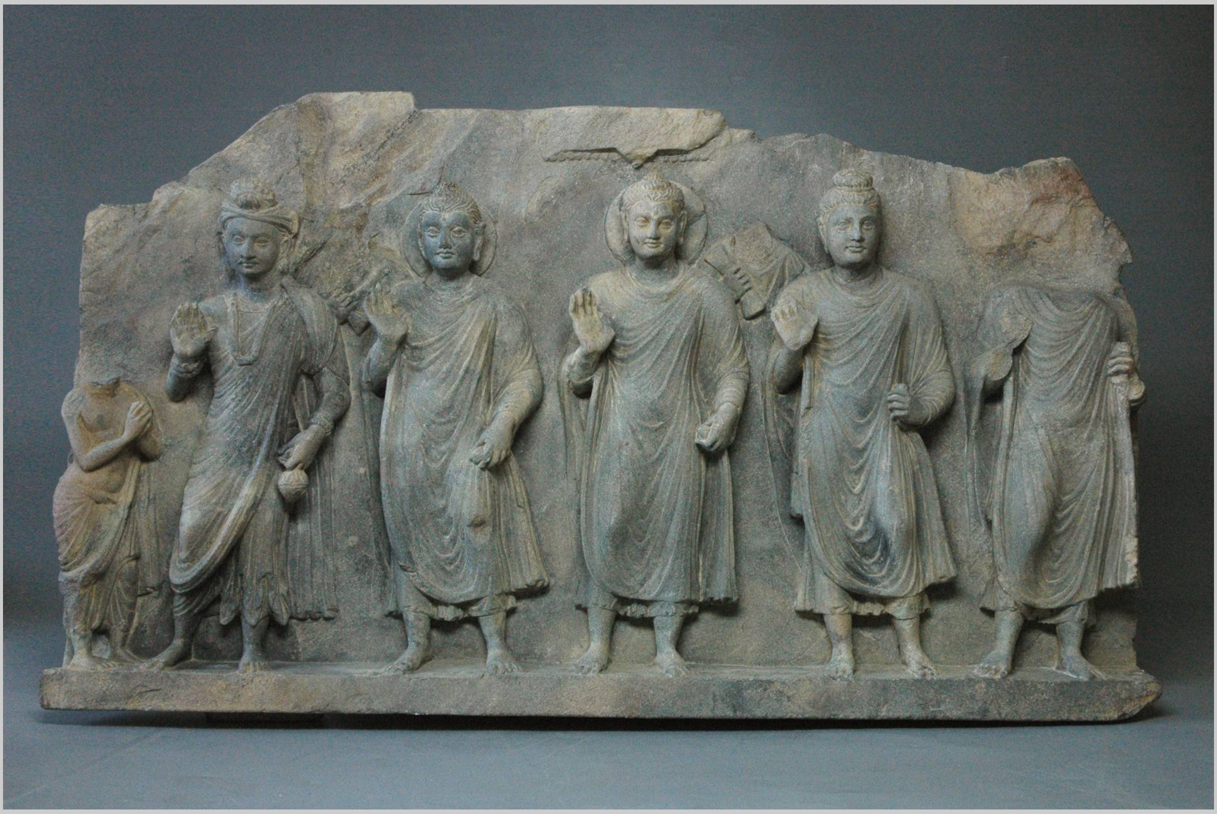


The mount was made from sandblasted stainless steel. The sculpture was not drilled into and the mount is not permanently fixed to the stone. The sculpture can be removed by loosening two screws.

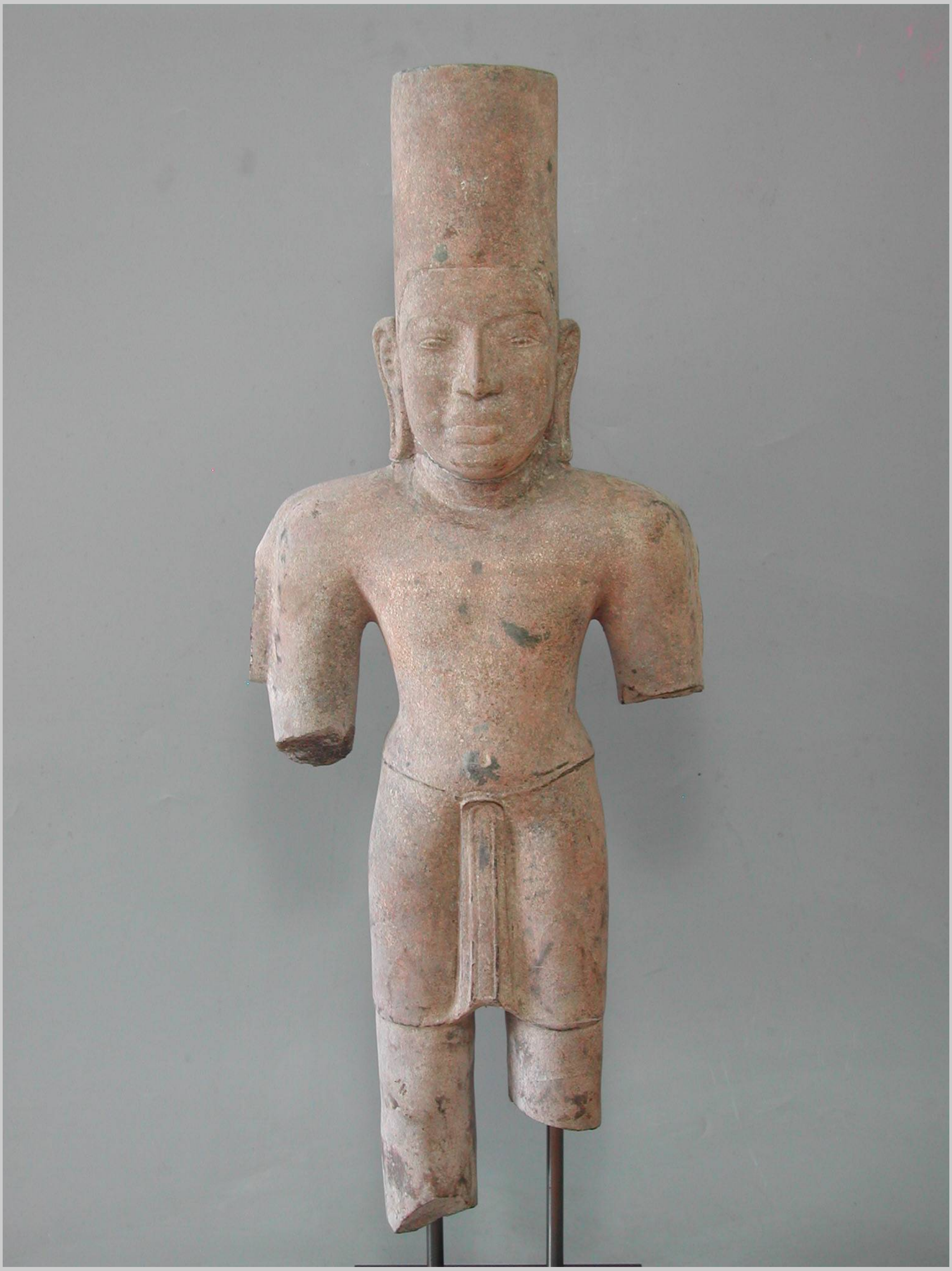


Grey Gandhara schist relief before conservation. There were extensive restorations to the heads that needed to be removed, and fragments of the relief were assembled incorrectly and needed to be taken apart.

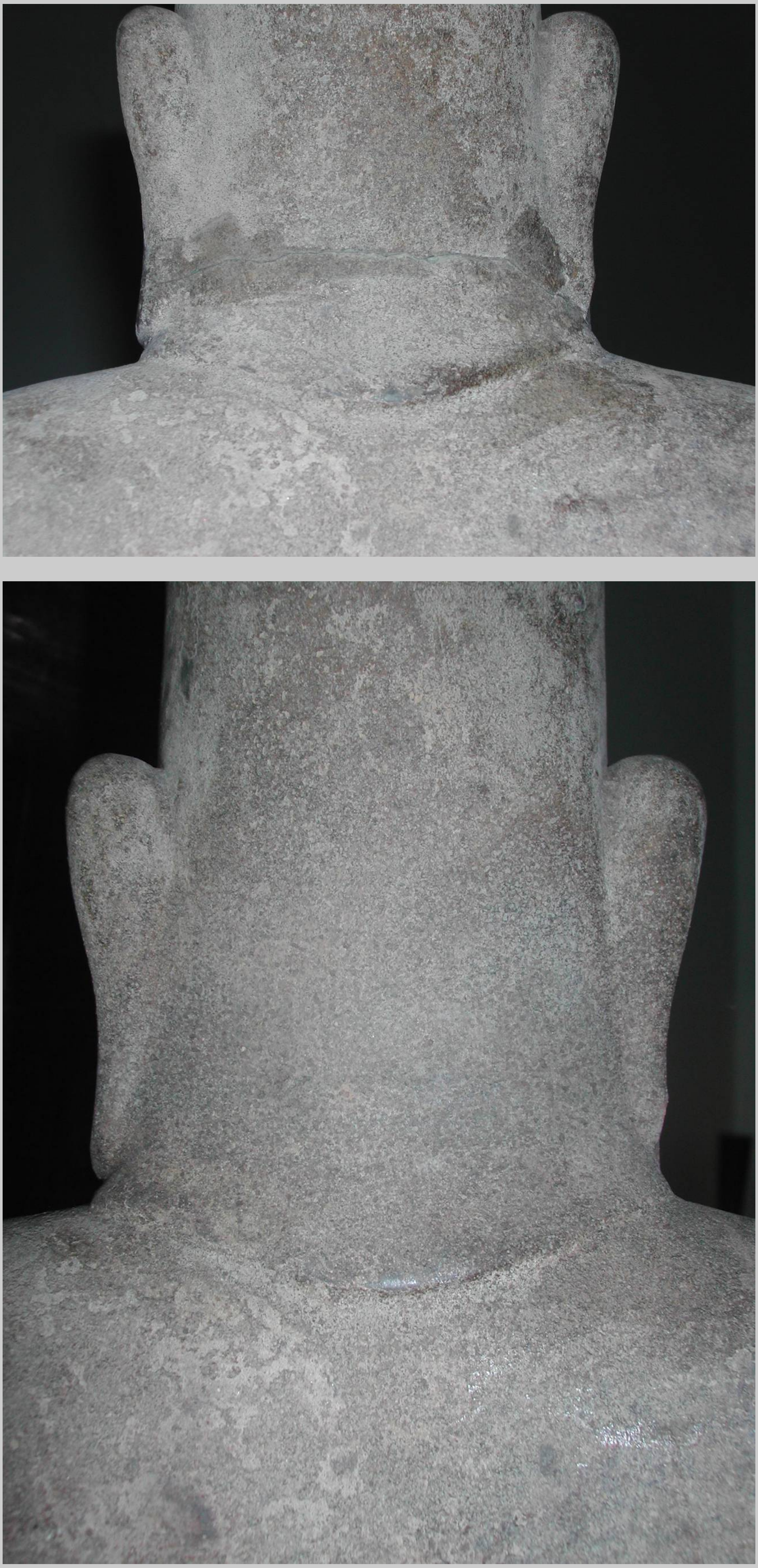




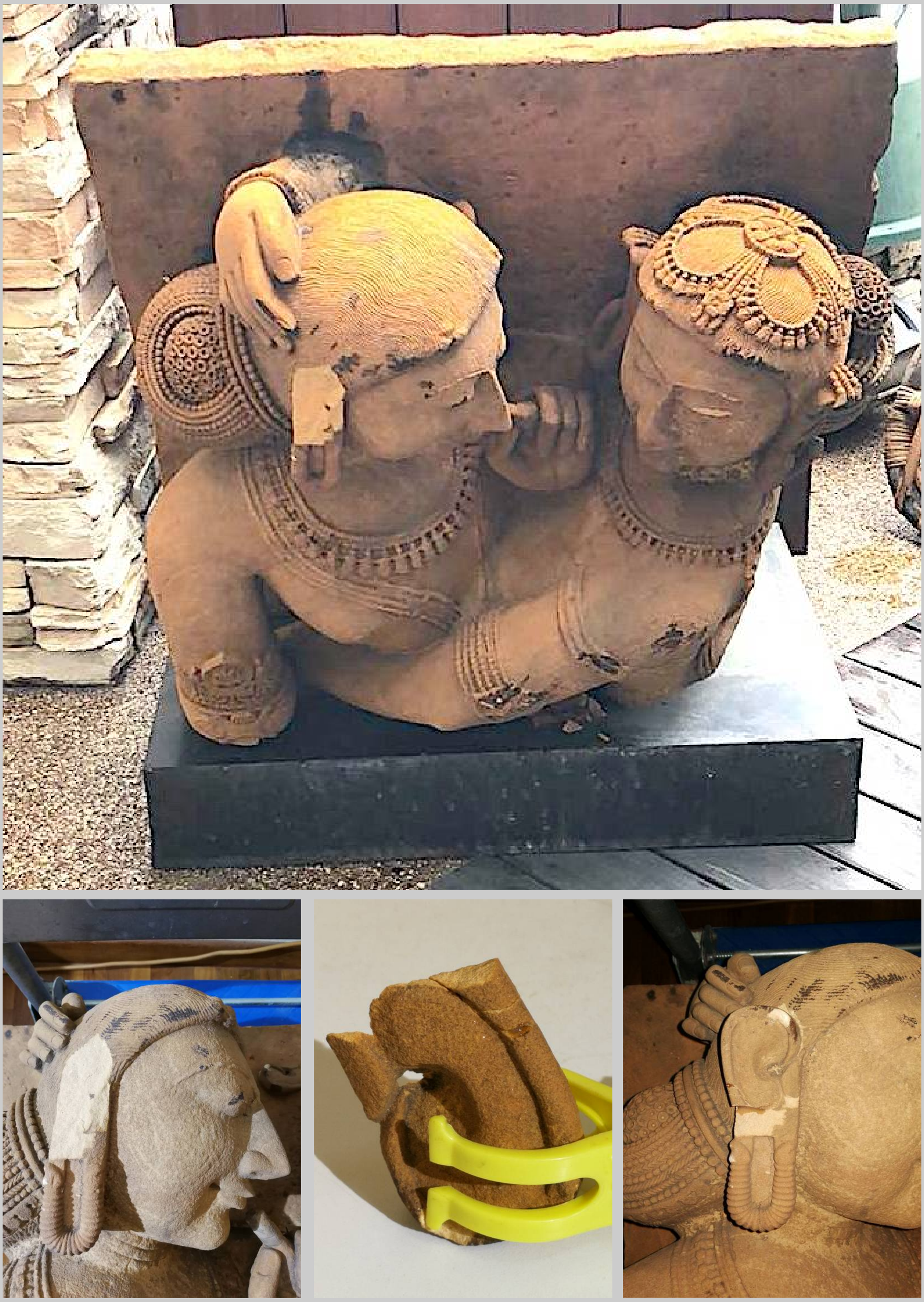
Grey schist relief, Gandhara ca 100-200 CE. One fragment needed removal, cleaning and repositioning. After removing the fake heads, the surface was cleaned and gap-filled, and colour matched.



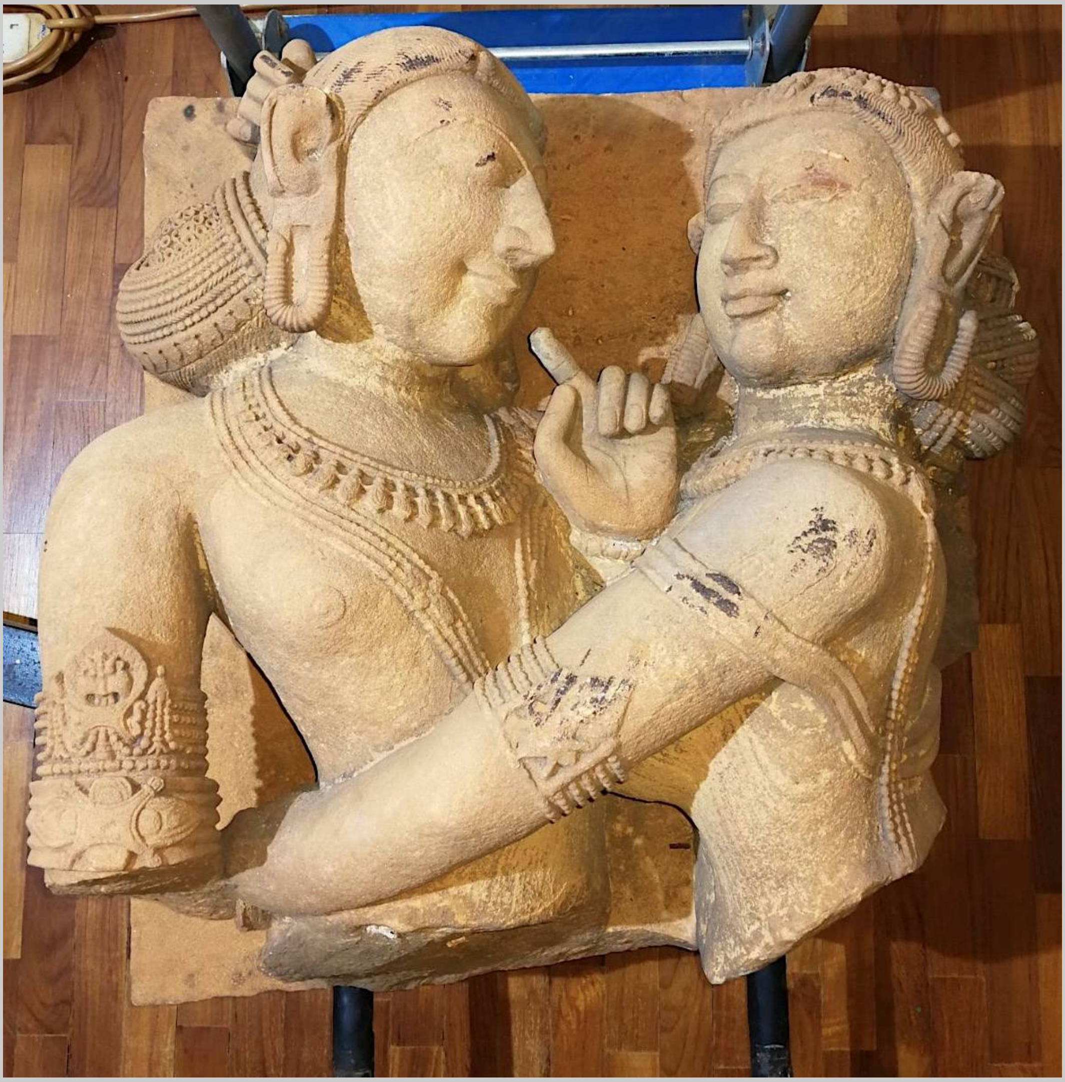
**Khmer Harihara late 7th-early 8th century, sandstone sculpture. The head was fractured at the neck and had been previously restored. The restoration was visually not acceptable as it distracted and disturbed the visual integrity of the rest of the sculpture.**

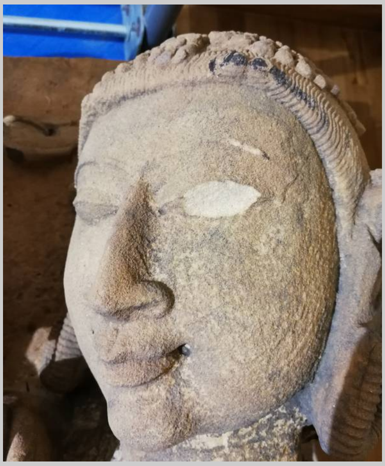


The back of the neck before cleaning the old restoration and after conservation/restoration. The treatment is reversible.

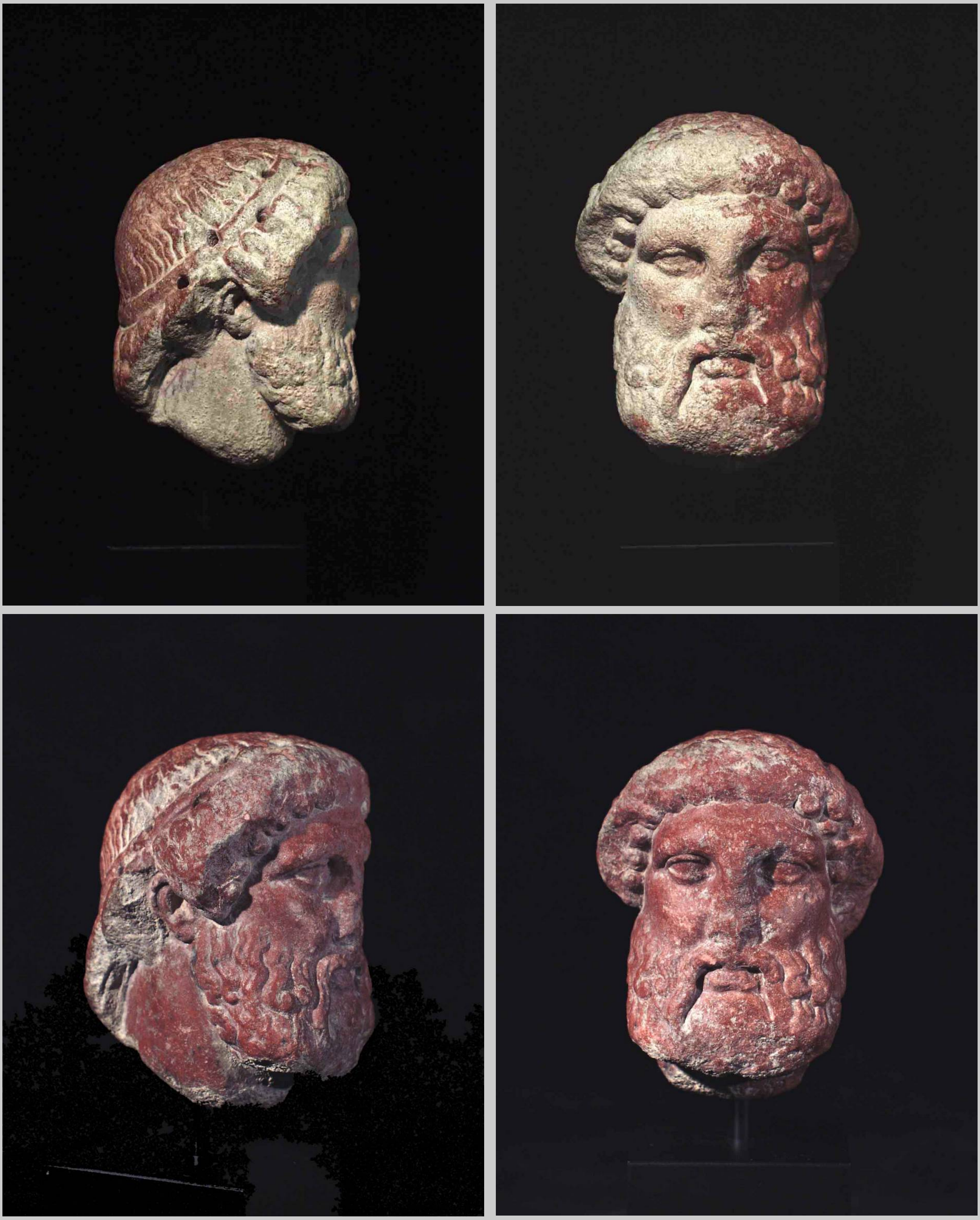


Indian sandstone relief. The plinth was made of plywood covered with patinated copper sheet. The artwork was displayed outdoors in a tropical climate. The plywood reacted with the high humidity and failed in its integrity and the stone fell over and was damaged in several areas.

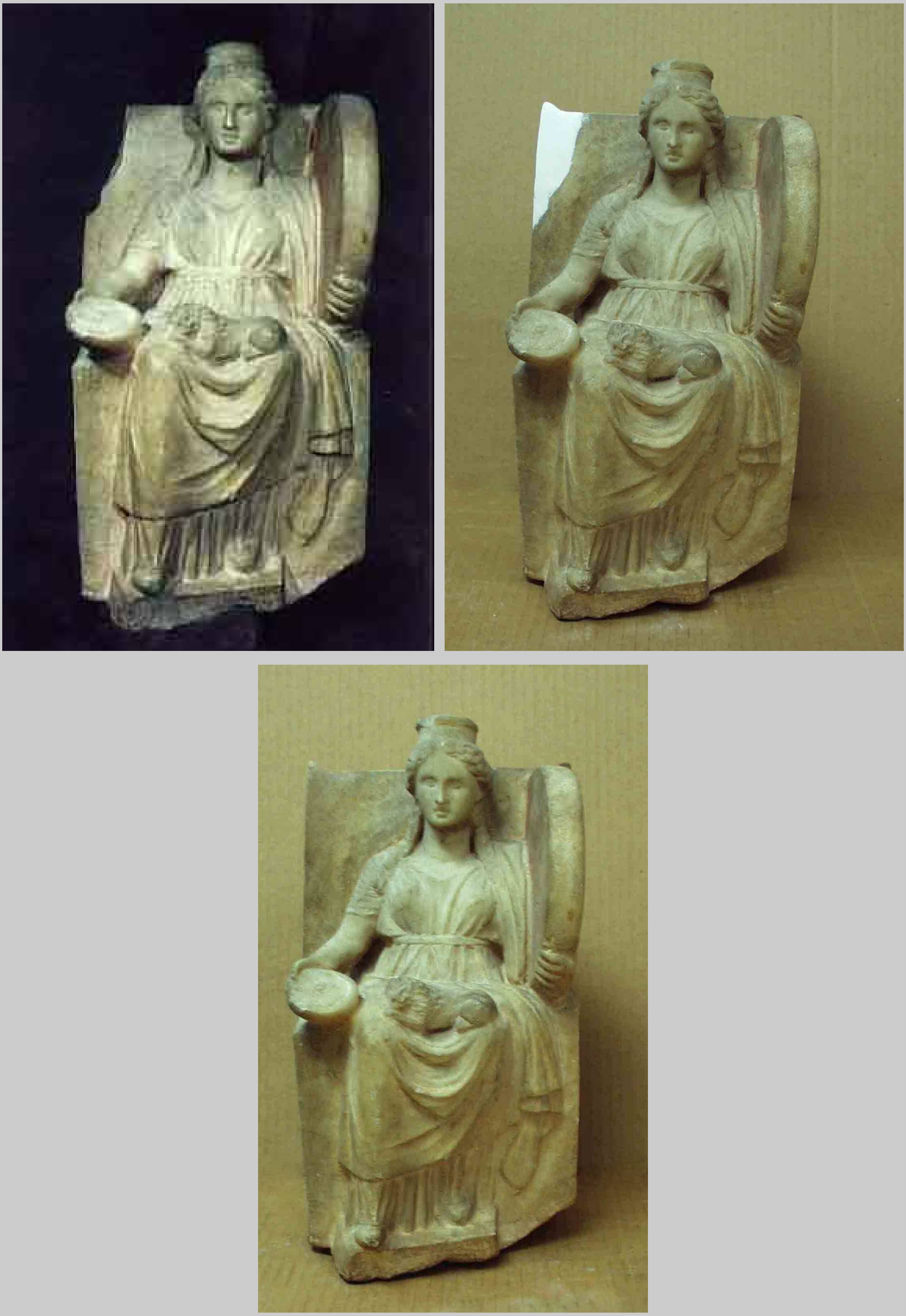




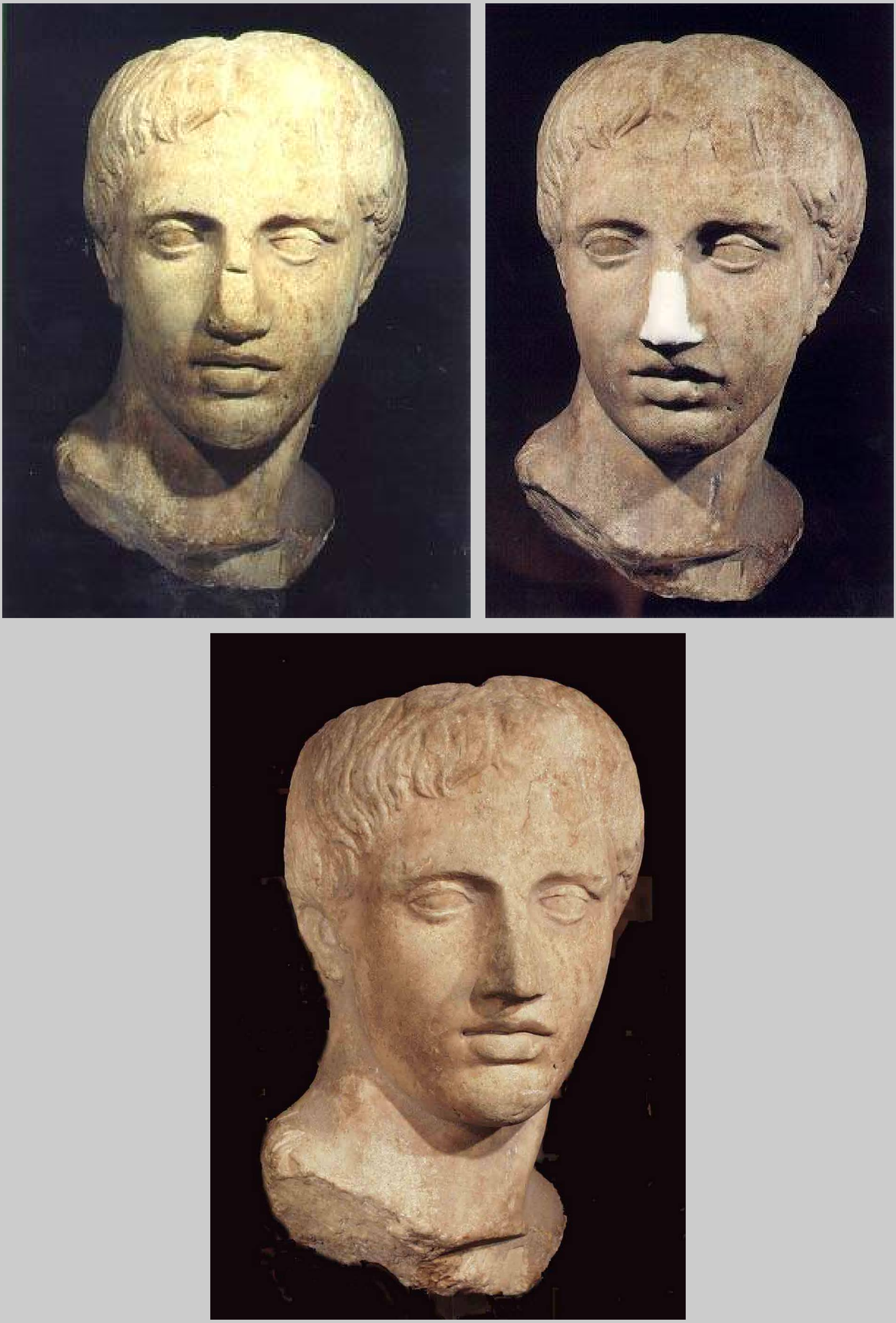
The main areas of damage were to the right ear of the male figure and the left eye of the female. The damaged areas were cleaned and re-integrated with a calcium carbonate filler containing synthetic solvent based resin. The fills were colour matched using acrylic paint.



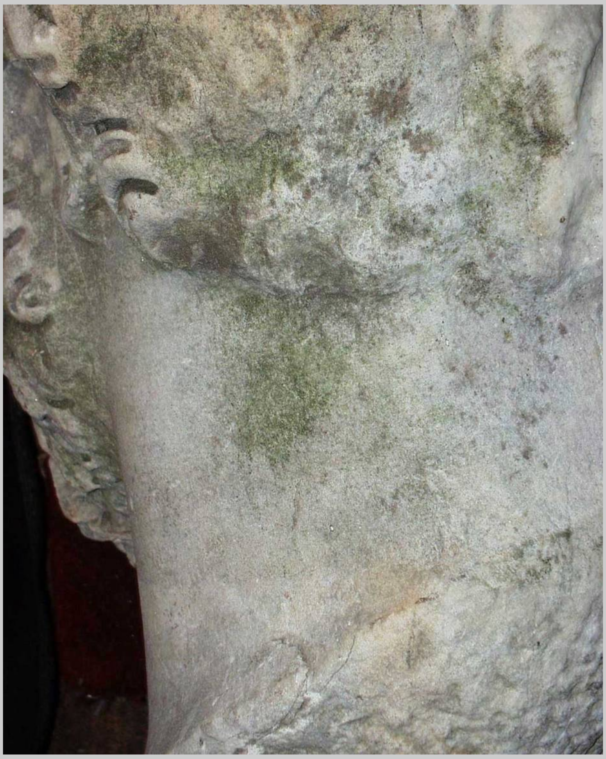
Hellenistic Rosso Antico Head of Hermes Propylaios with a broad face framed by rows of corkscrew curls over the brow and full beard with long mustache Ca. 2nd-1st Century BCE, height: 9.2 cm. The head was partially covered in off white calcareous deposits. These were mechanically removed in conjunction with a chemical complexing agent. Not all deposits were removed to avoid over-cleaning.

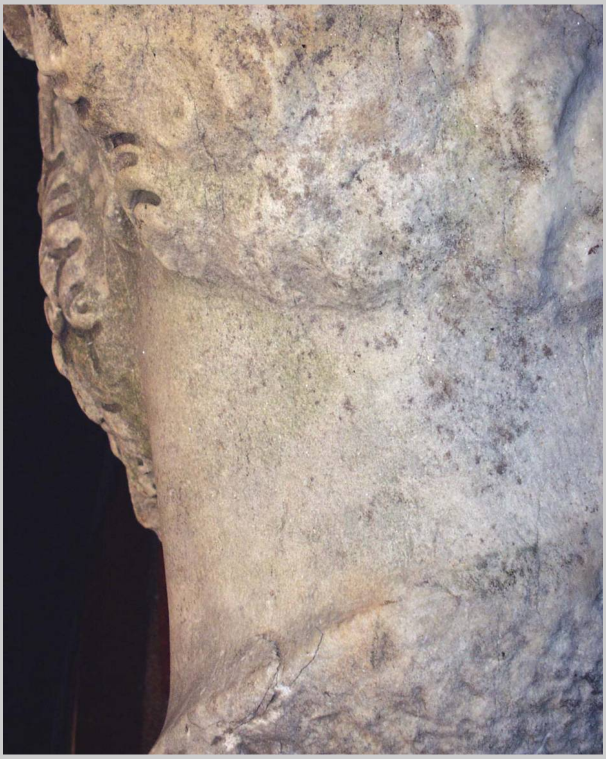


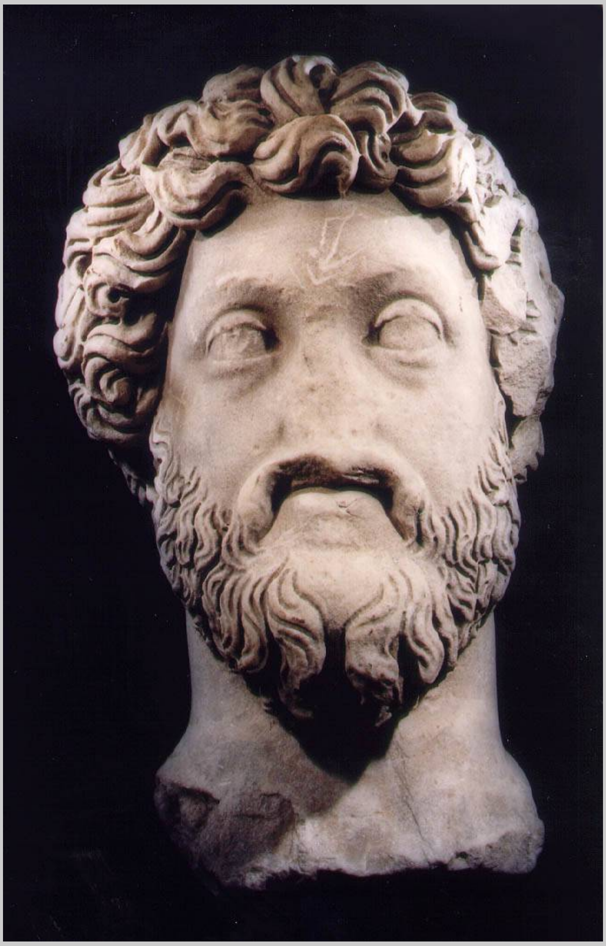
Greek marble statue of Cybele. The god is enthroned, wearing a himation and polos, holding a tympanon and patera, a small lion resting on her lap. Ca. 3rd-2nd Century BCE. The proper top right corner was missing. The corner was reshaped with calcium carbonate in an acrylic resin mixture. After shaping, the corner was colour-matched to the rest of the aged marble.

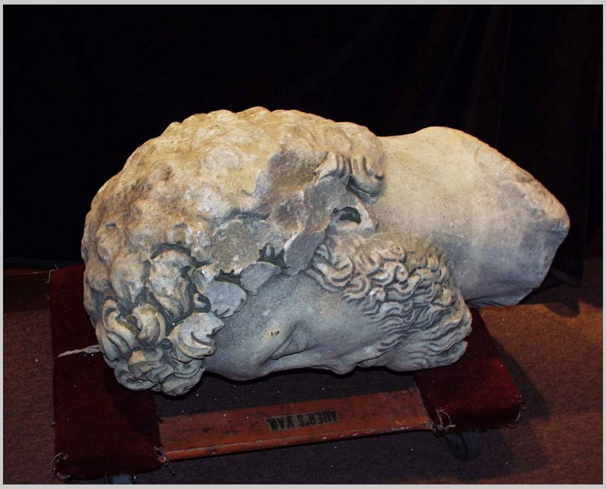


Head of the Doryphoros, based on the classical Greek original by Polykleitos. 1st-2nd Century CE. Small areas of restoration on proper right cheek, eye and nose. The damaged areas were filled with calcium carbonate filler, reshaped and colour matched with acrylic colours. The nose shape was modelled freehand and was not copied from an original to clarify the new addition.



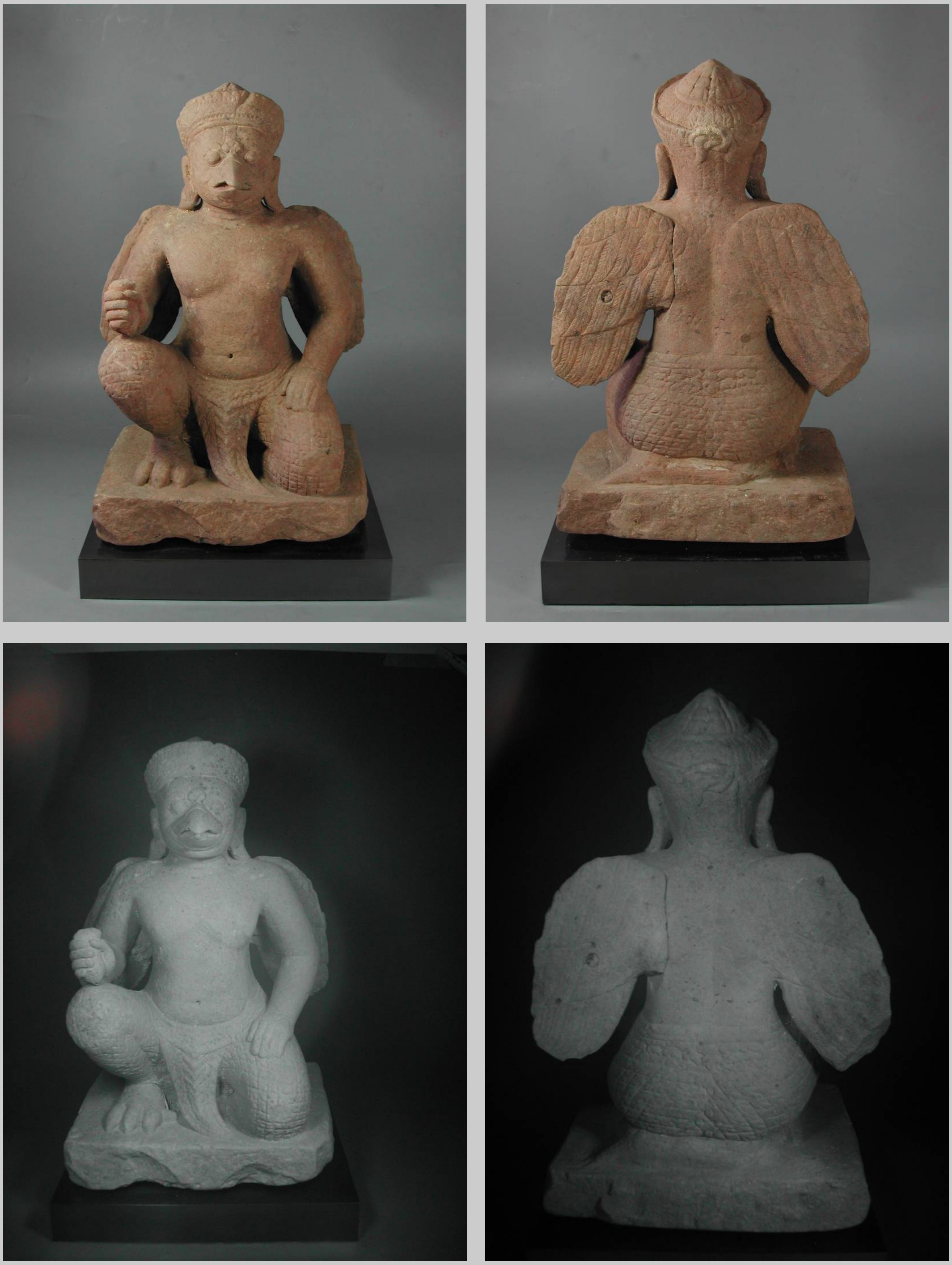




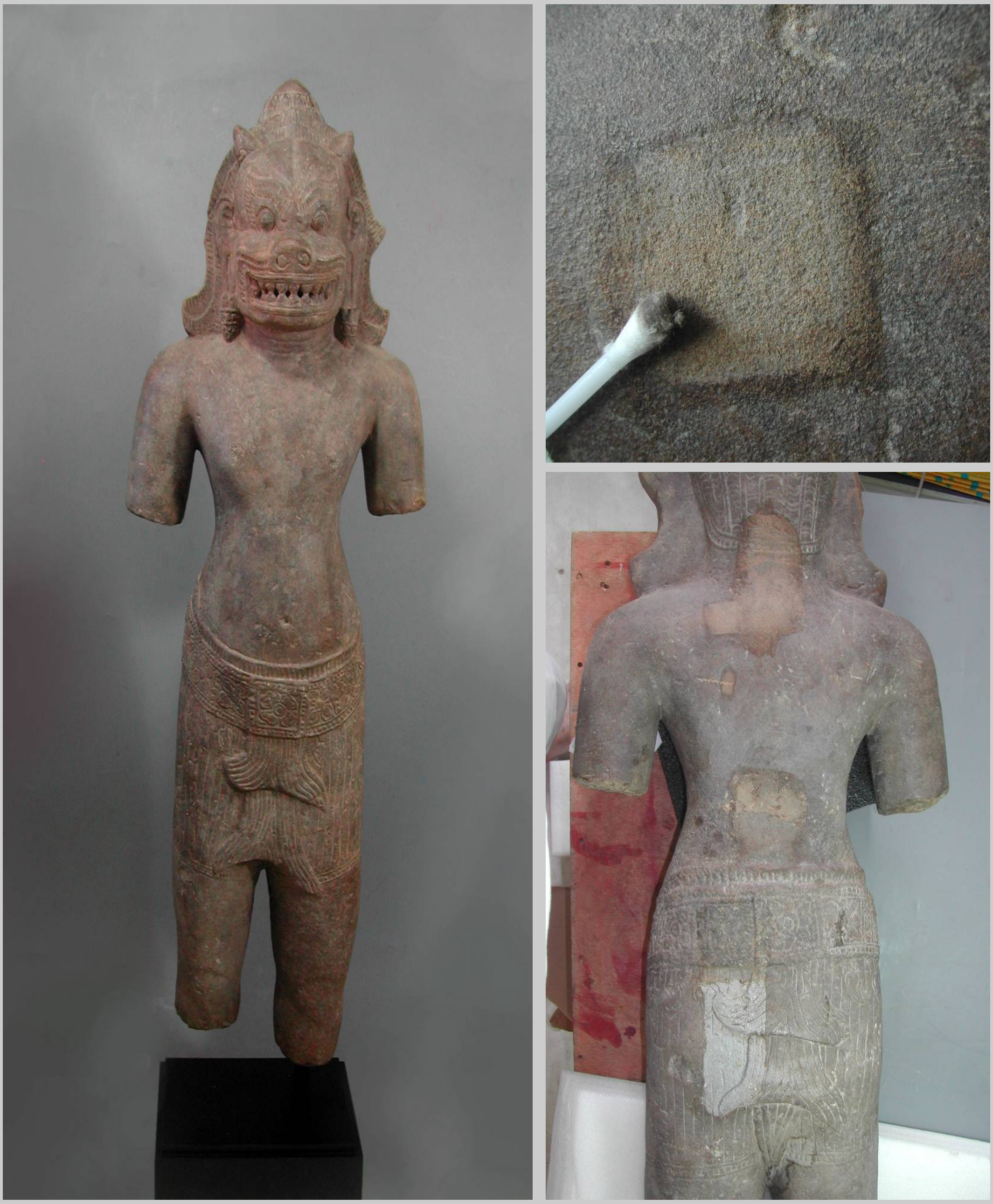


Roman Colossal Tassien marble head of the Emperor Marcus Aurelius With masses of deep curls and beard. Weight: 400kg haight: 76 cm. Unearthed clearing a Victorian property in Liverpool. The head was covered partially in lichen, organic stains, paint and in one area even lead. The surface was rough and patchy as it was laying face down in the garden. The lower lip had a fissure on the proper left side.

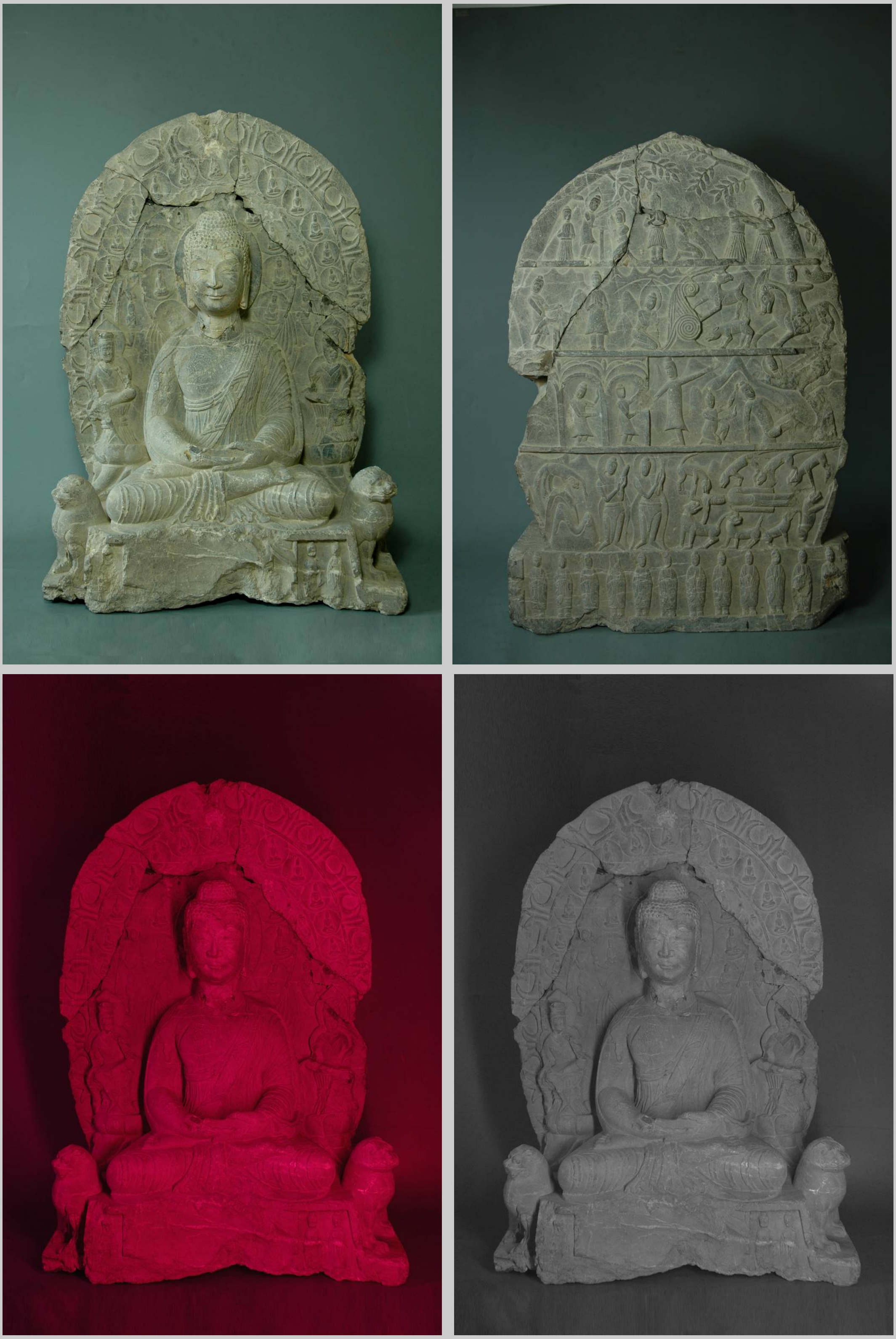
The forehead had various recent scratches due to tool marks, and there was a similar scratch running over the proper right temple. A large gouge was on the proper right back of the head. The surface was cleaned with a complexing agent. The black paint was removed with a mixture of solvents. The lead stains were removed mechanically. The crack in the lip was filled with an organic filler containing chalk, and the fill and other scratches were retouched and colour matched with mineral pigments in an organic binder The green lichens were removed with an oxidising agent.



Sandstone Garuda, Cambodia 11th century. The sculpture was photographed using an infrared filter. Other than the old fracture on the base of the proper left wing, no new additions or restorations were discovered, the wear and tear is consistent with an ancient sculpture of this age.

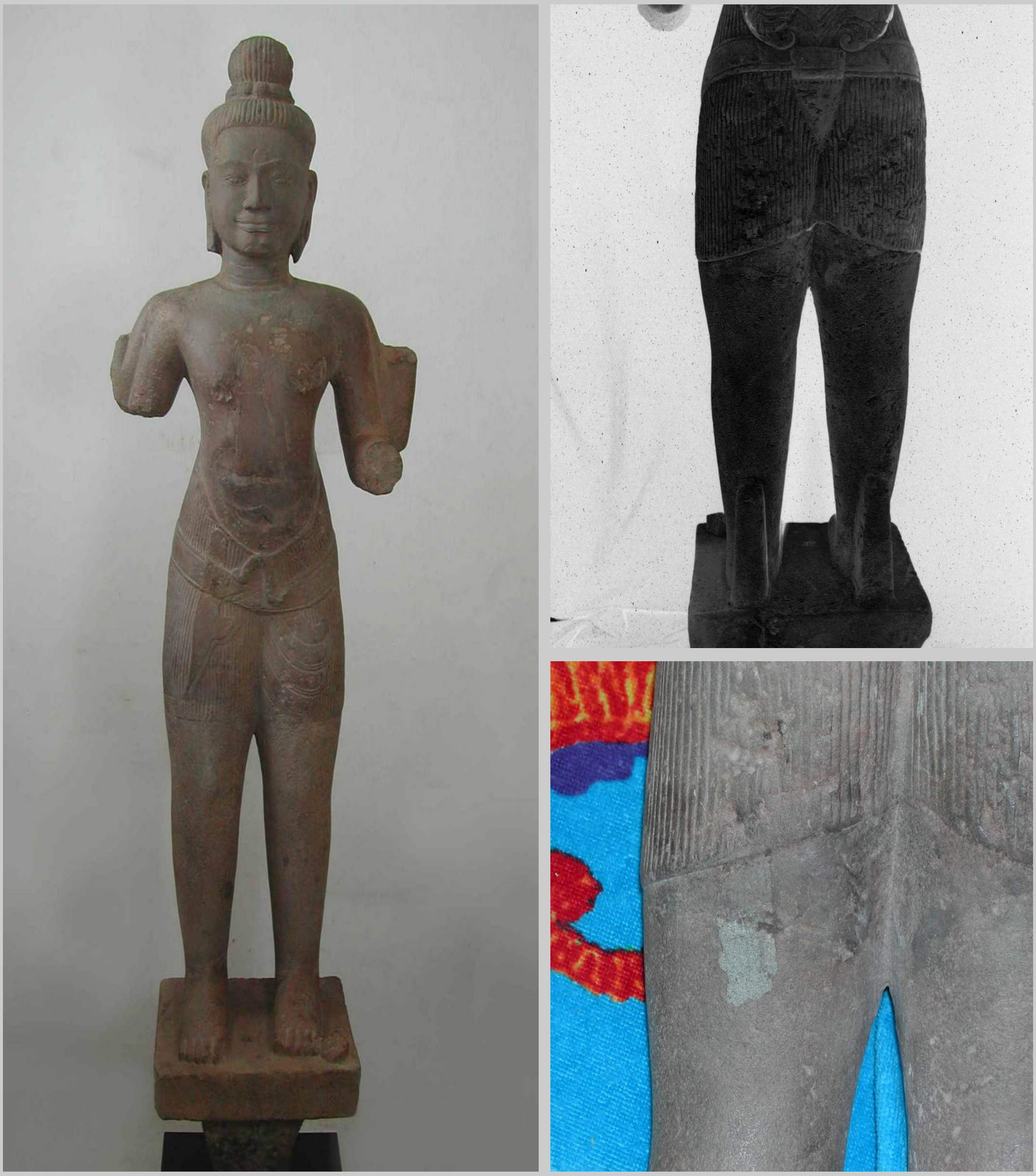


The Khmer grey-stone sculpture of Narashima (Bayon, 12th to 13th century) was analysed using solvent based Spot-Testing. The artificial patination due to pigments was completely removed. The hips of the figure were original. The torso and the legs were made of two different materials. The hips were well aged and the deteriorated discolouration could be removed with solvents. The wear and tear of the surface was due to natural ageing.

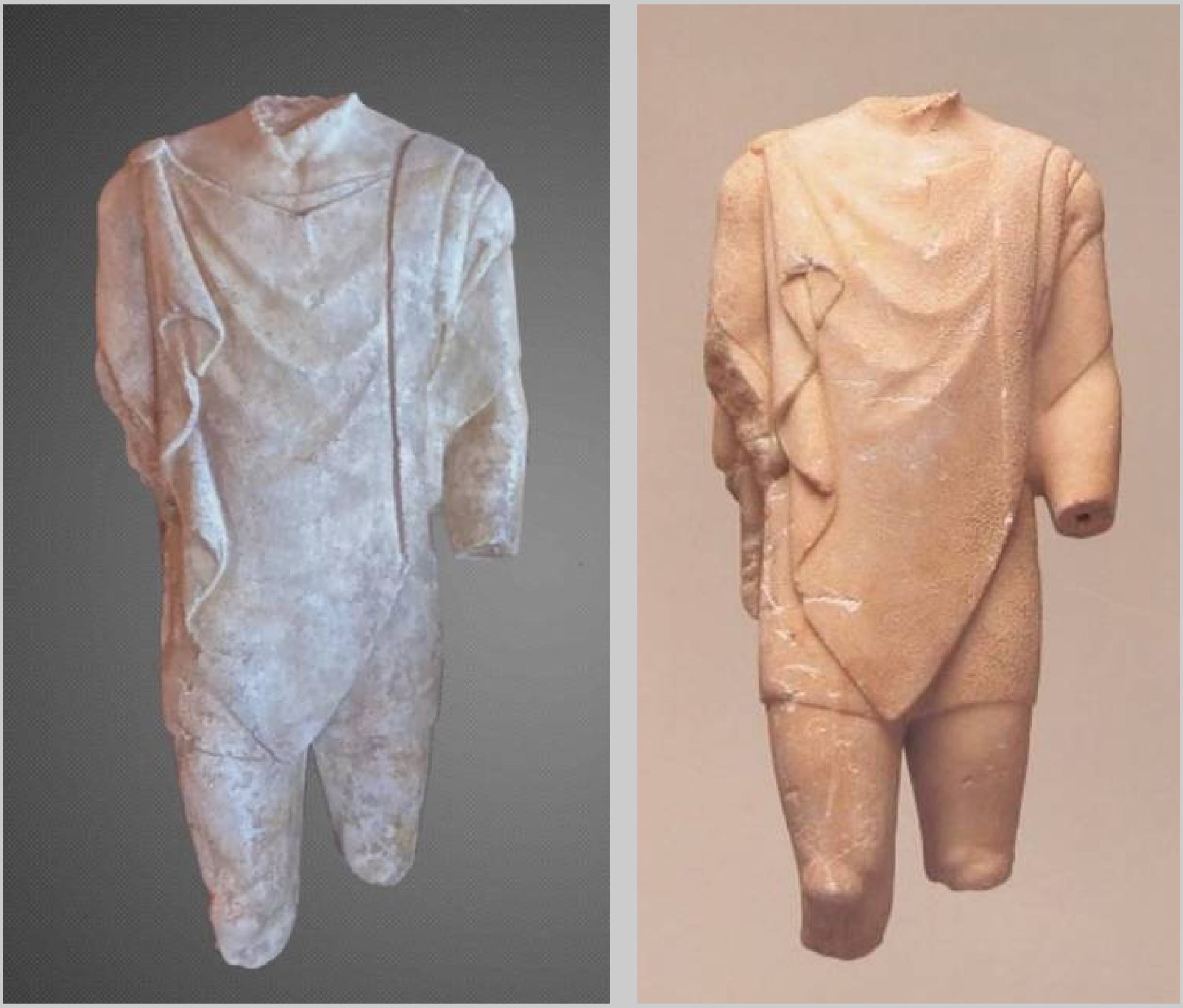


Seated grey-stone Buddha, Northern Wei , ~6 Century CE, China

Infrared left and Ultraviolet Imaging right were taken. The images clearly show the fractured parts. And highlight the inclusions and veins. They do not suggest or outline any disparate or added materials other than the adhesive. The topography of the surface was coherent. Some areas of the face and part of the neck had more erosion.



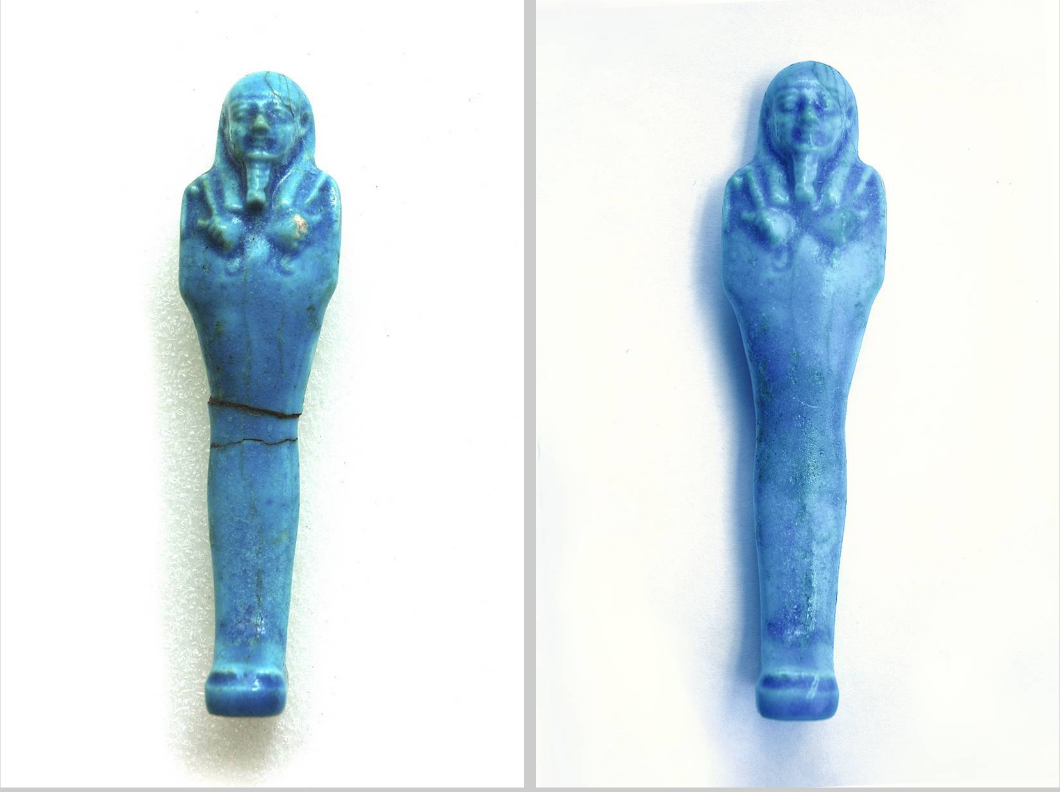
Vishnu sandstone sculpture, Cambodia. The torso and the head were original, the legs displayed a different structure during infrared photography. Wet chemical testing, actually confirmed the optical findings and dissolved the patina on the recently added areas and not on the ancient parts. The naturally weathered surface is usually much more resilient to chemical solutions than newly applied patinas, as the ancient erosions develop over a long period of time and follow the softer areas of the surface. Therefore, it is also below the surface layer and not just on the surface.



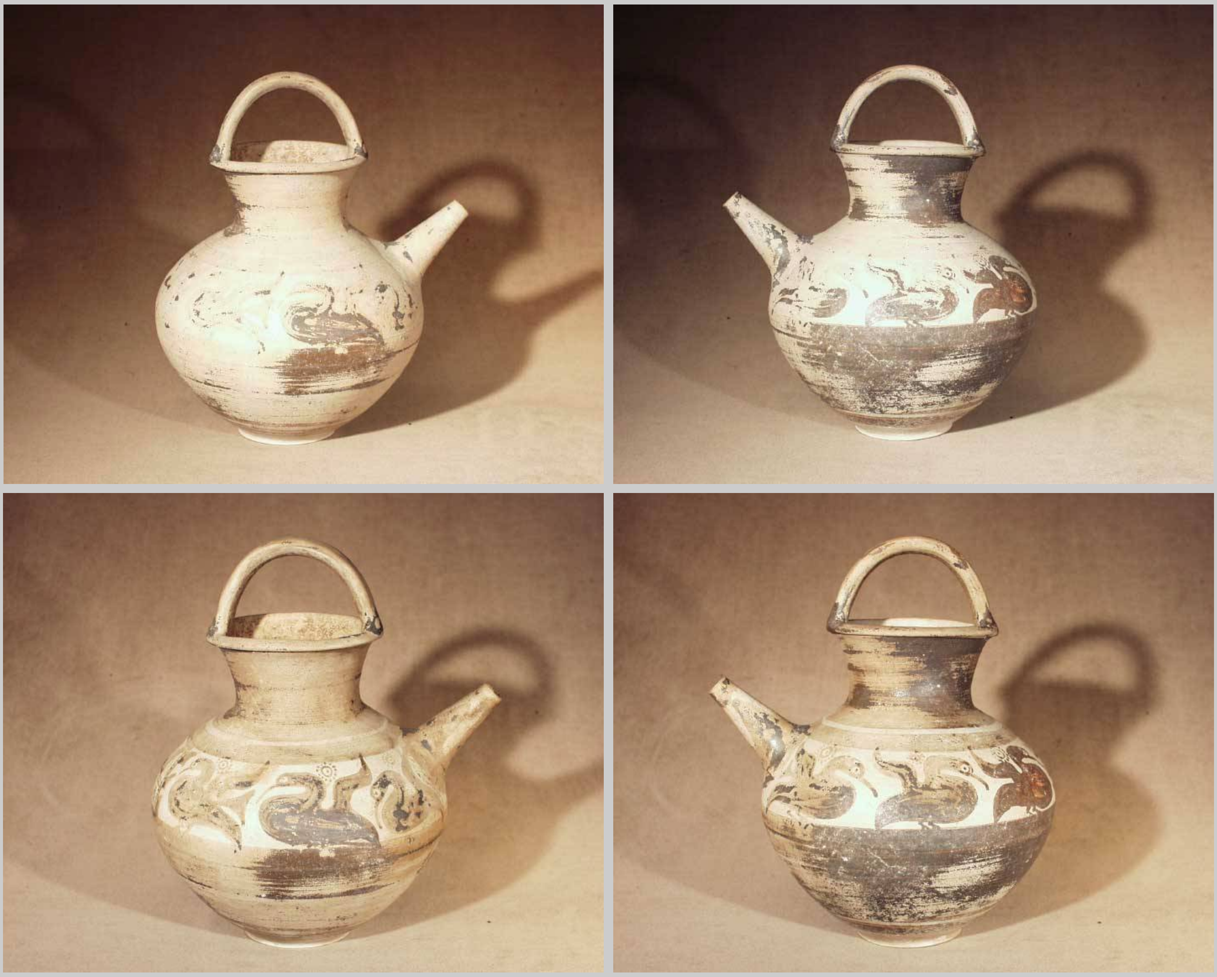
Antique male marble torso. The torso on the grey background is a copy of the torso on the beige background.

The male torso was coated with a protective layer of an acrylic resin that was highly diluted to not obscure the topography of the fine carving and weathering. Then a very thin silicone rubber polymer was applied using a brush. This was followed by a thicker silicone rubber mixture thickened with a filler and allowed to cure overnight. The original marble was extracted and the acrylic coating was removed using solvents. The silicone rubber mold was filled with a thin layer of polyester that contained white pigments. Then a second layer and third layer of clear polyester containing glass fibres was added. The next day the polyester torso was removed from the silicone mold, and the surface could be coloured. The colouring agent was mineral pigments suspended in a solvent which was allowed to dry. For ethical reasons the torso was not exactly colour matched to the original to avoid confusion. The original was exhibited in the museum and the copy went to the owner of the artwork. Copying such important pieces and loaning them to a museum allows public access and safety for the artwork.

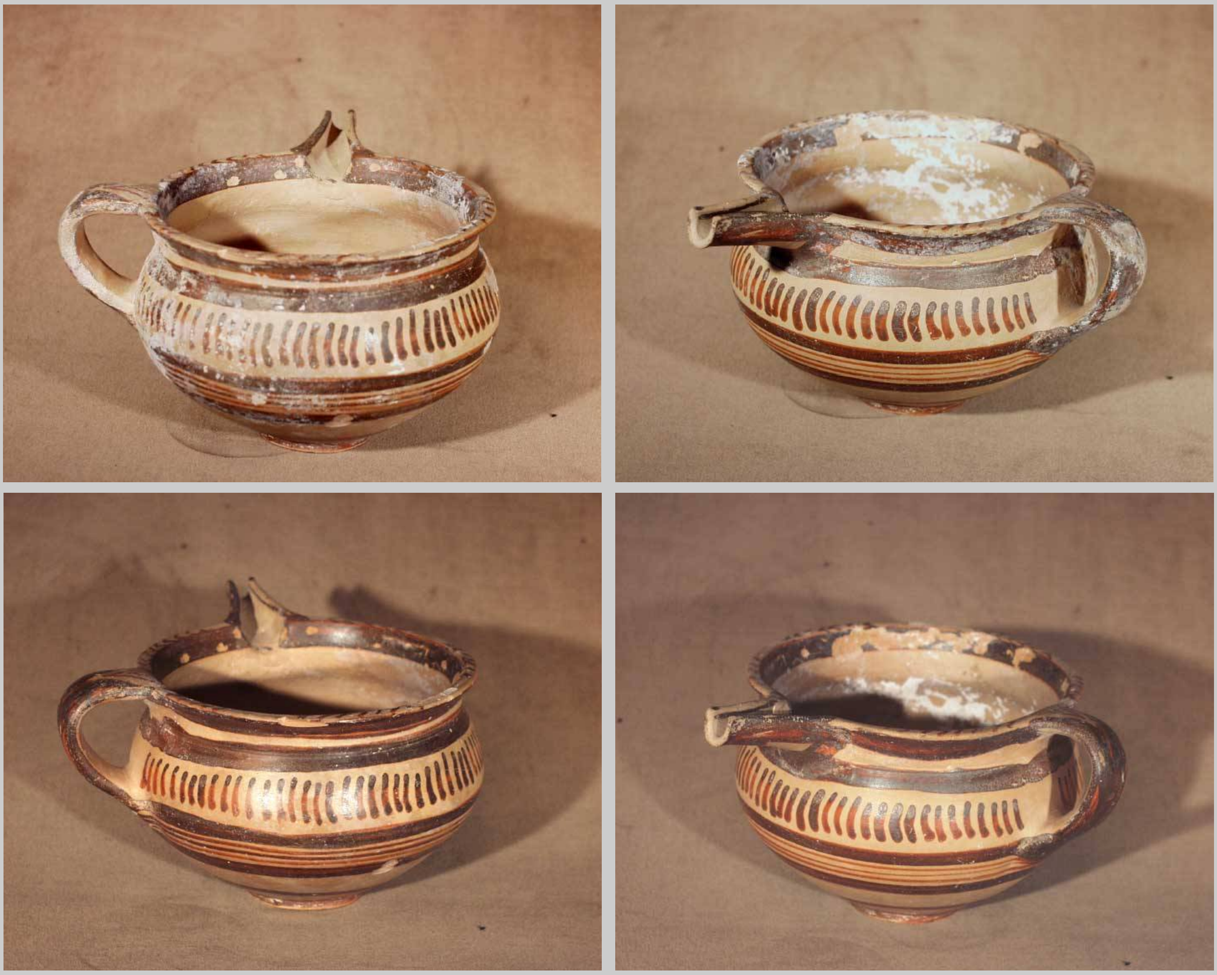
# Ceramic



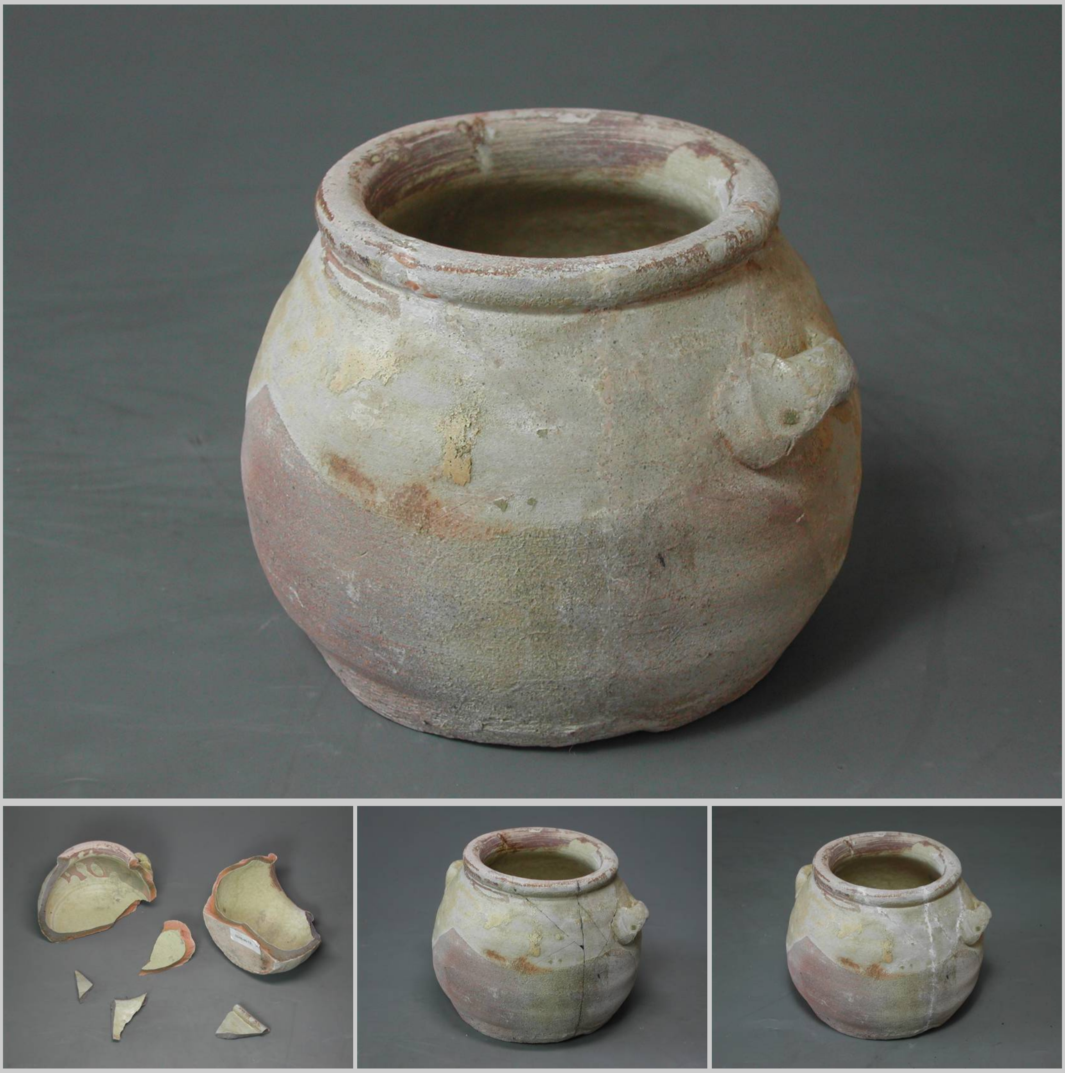
Ancient Egyptian Blue Faience Ushabti. This type of faience is sintered-quartz ceramic, with a surface vitrification. The core is not very dense and can be crumbly. In this instance, the low density and cohesion of the quartz grain caused the fracture of the, the low density and cohesion of the quartz grain caused the fracture of the sculpture in two places near the hips. There is distinct older restoration. Some of it seem to be shellac. The old restoration was opened and removed using solvent. The fractures were then joined using a modern synthetic resin. The missing areas of the fracture were filled using a synthetic resin containing calcium carbonate. The fill was then colour matched using acrylic colours. The restoration is fully reversible.



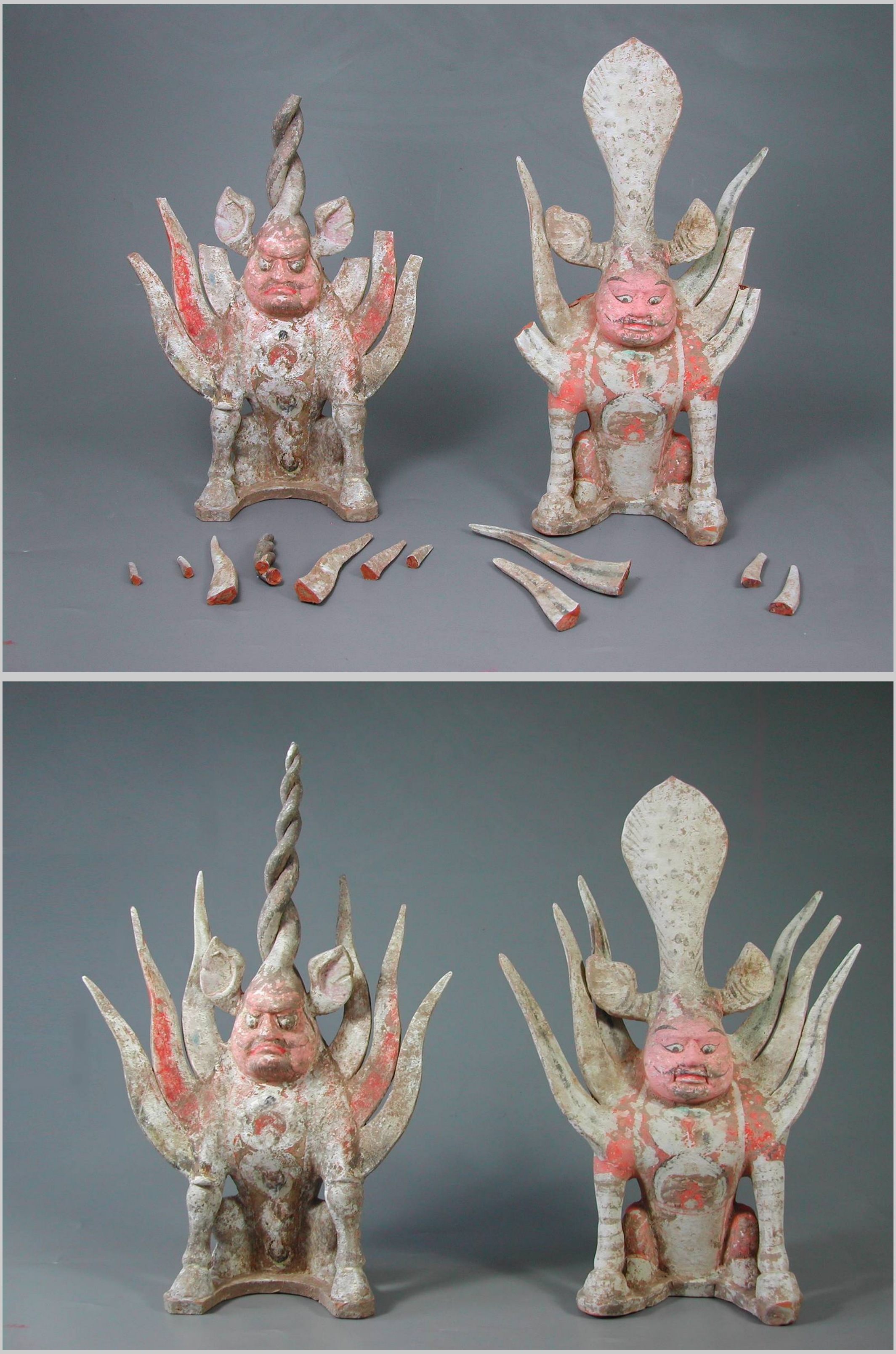
Mycenaean pottery vessel, with bail handle and side spout. Decorated with two groups of three birds flank central square panel of decoration opposite spout., Ca. 1300 BCE, H: 22.8 cm. Most of the original glaze had deteriorated and was missing. The missing glaze was still faintly outlined in the terracotta surface. The missing dark brown areas were filled in with a light acrylic brown wash that matched the original glaze. In this manner the decoration was more clearly visible, without overpainting most of the missing areas and obscuring the original areas. In this manner the object was easier to read with out compromising its authenticity. The acrylic paint is soluble in solvents and therefore reversible.



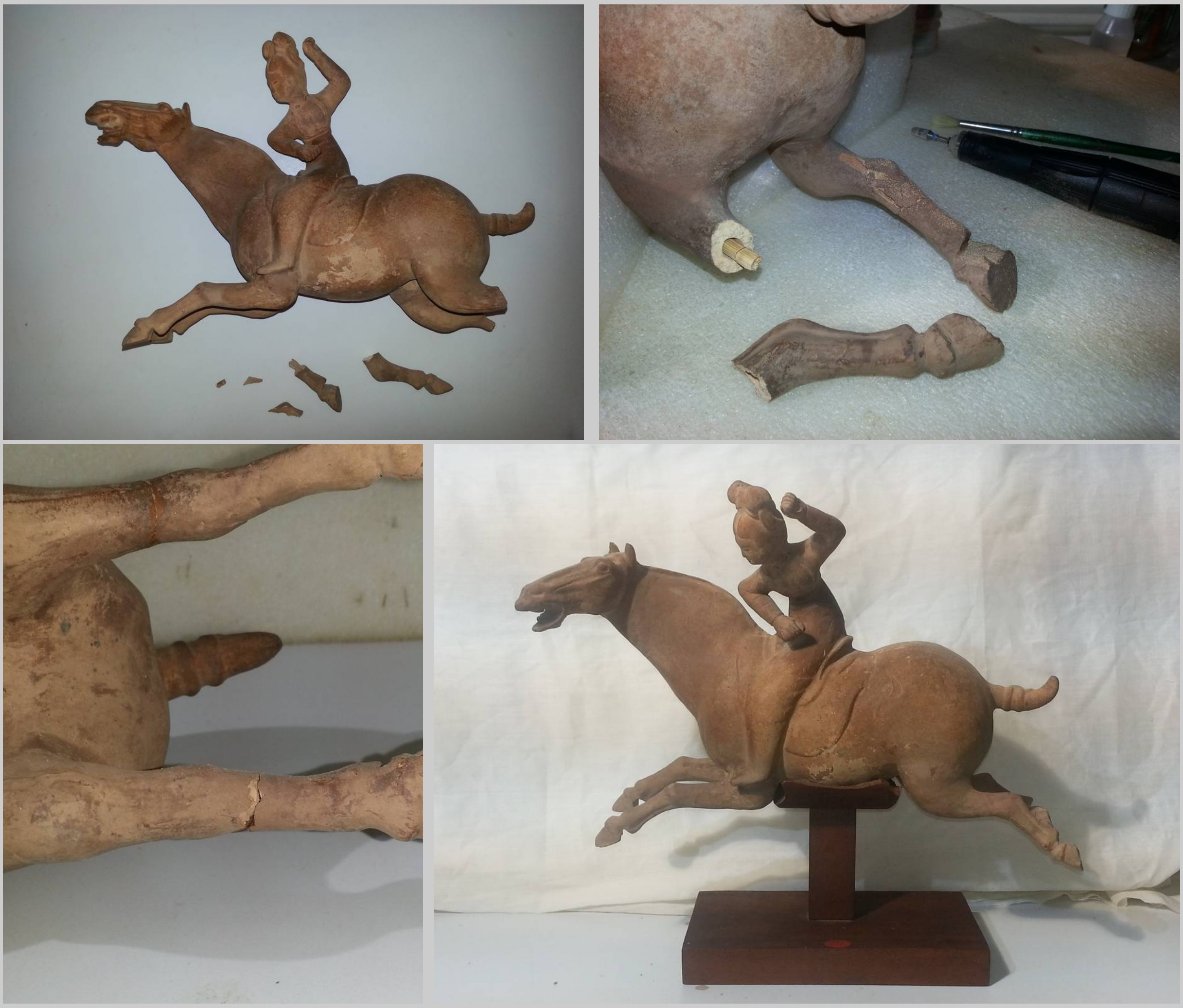
Mycenaean pottery spouted bowl, Decorated in brown slip with overall banding; chevrons, on lip; band of vertical lines at shoulder;  ring handle. Late Helladic IIIB, Ca. 1340-1230 BCE, H: 8.9 cm, W: 16 cm.
There was minor flaking and spalling of the brown glaze.
Calcareous deposits on the outside surface.
The calcareous deposits were removed using scalpel and glass bristle brush under a binocular microscope 30x magnification. Parts of the flaking glaze was then consolidated with acrylic in acetone. Some of the missing glaze on the outside was in-painted with acrylic paint. The treatment is reversible in solvents.



Antique terracotta vase. The vase was fragmented, joined with a synthetic resin, gap-filled with a calcareous filler and colour matched with conservation grade acrylic paint.

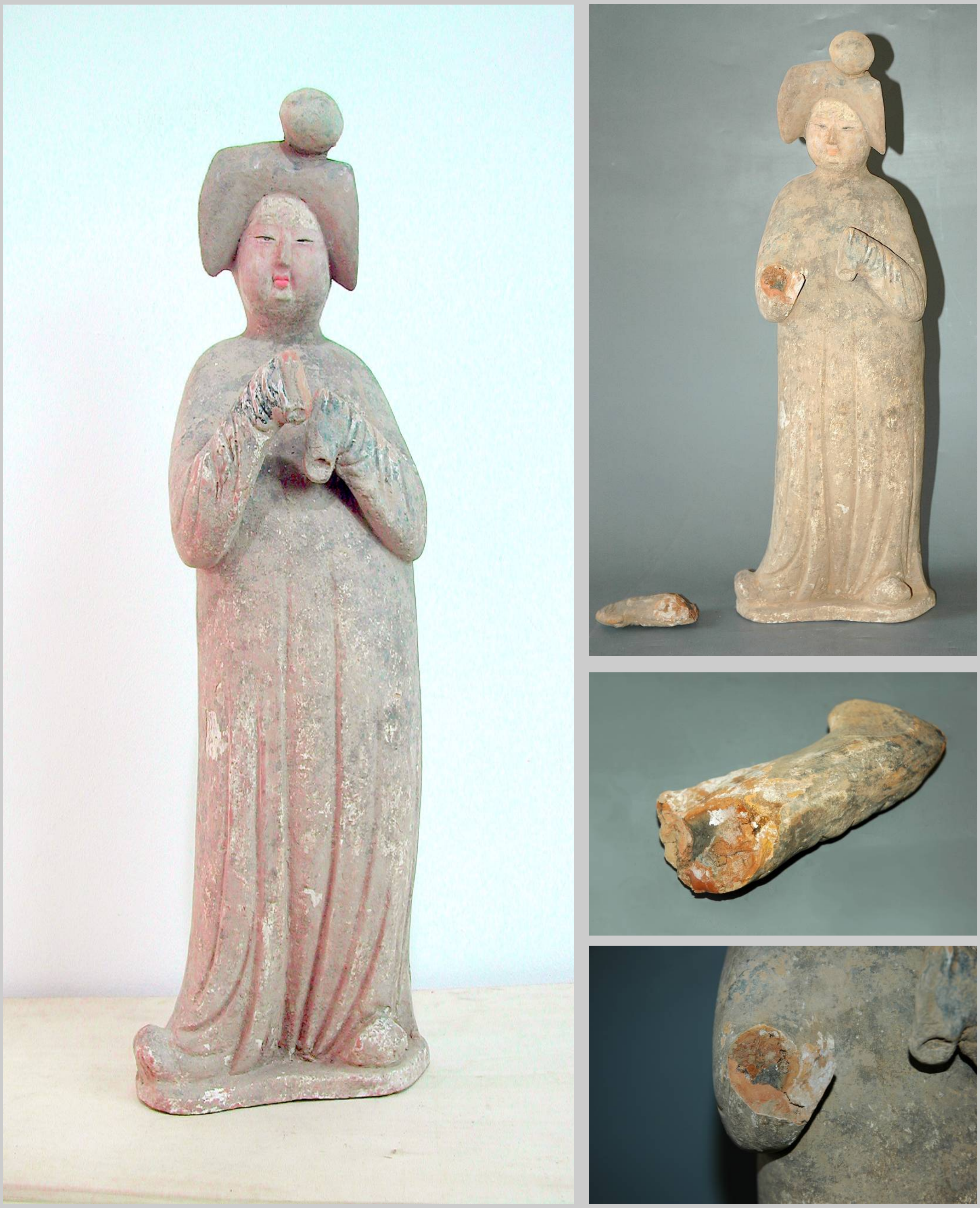


Chinese Tang Dynasty (618 - 907 CE) Terracotta “Earth Spirit” Tomb Guardian Figure. Several protruding parts had fragmented during transportation. In several areas old restoration failed. The fractures were cleaned and joined with a synthetic polymer, the gaps filled with a calcium carbonate filler and the fills retouched with mineral pigment containing synthetic paint.



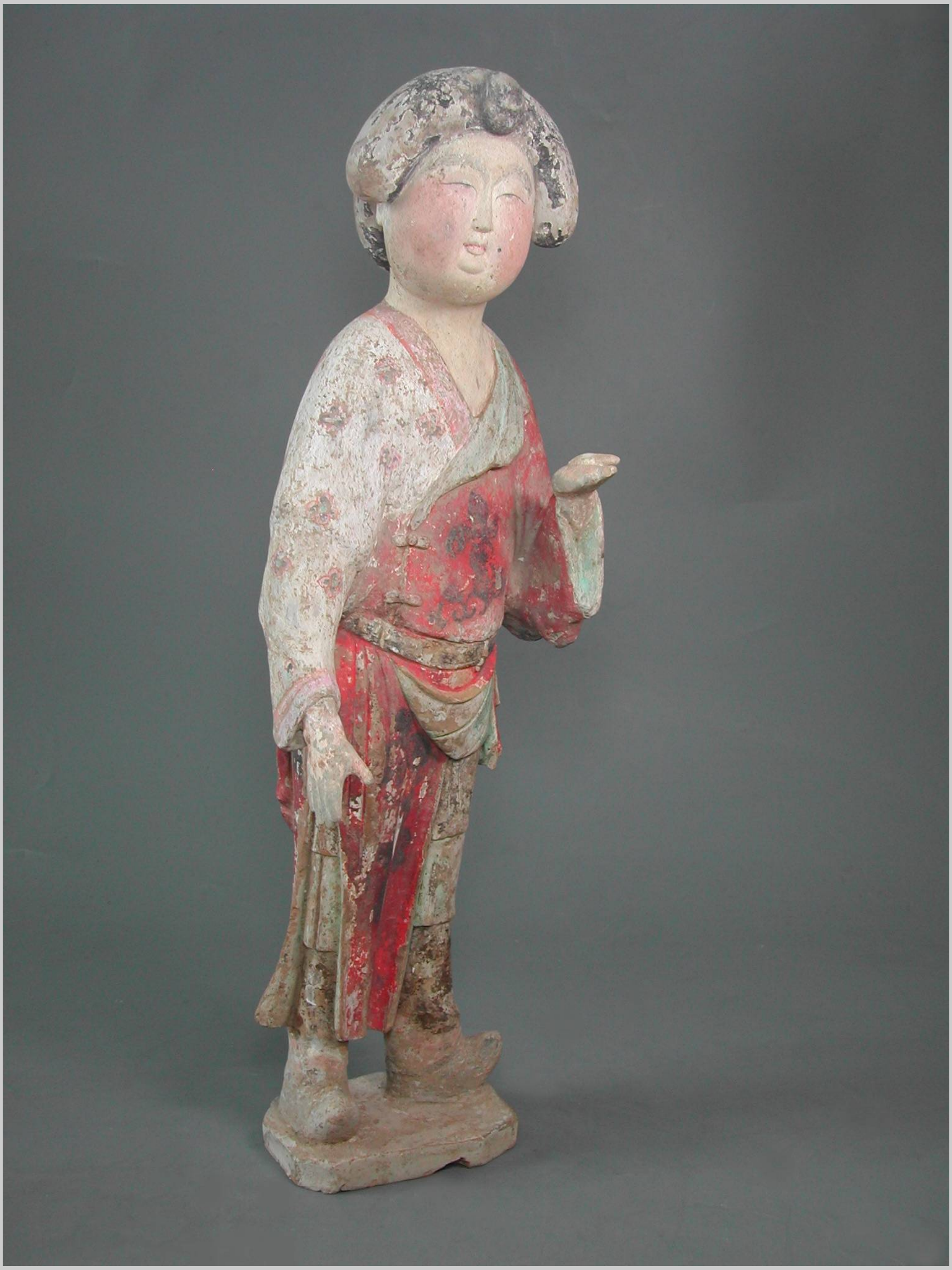
Antique Chinese terracotta female polo-player Tang dynast.

The figure had been previously restored in the same areas as the new fractures. The old adhesive was removed and a new dowel inserted to reinforce the legs. The join was restored using a two component polymer, gap filled with a gesso filler and retouched using acrylic colours.

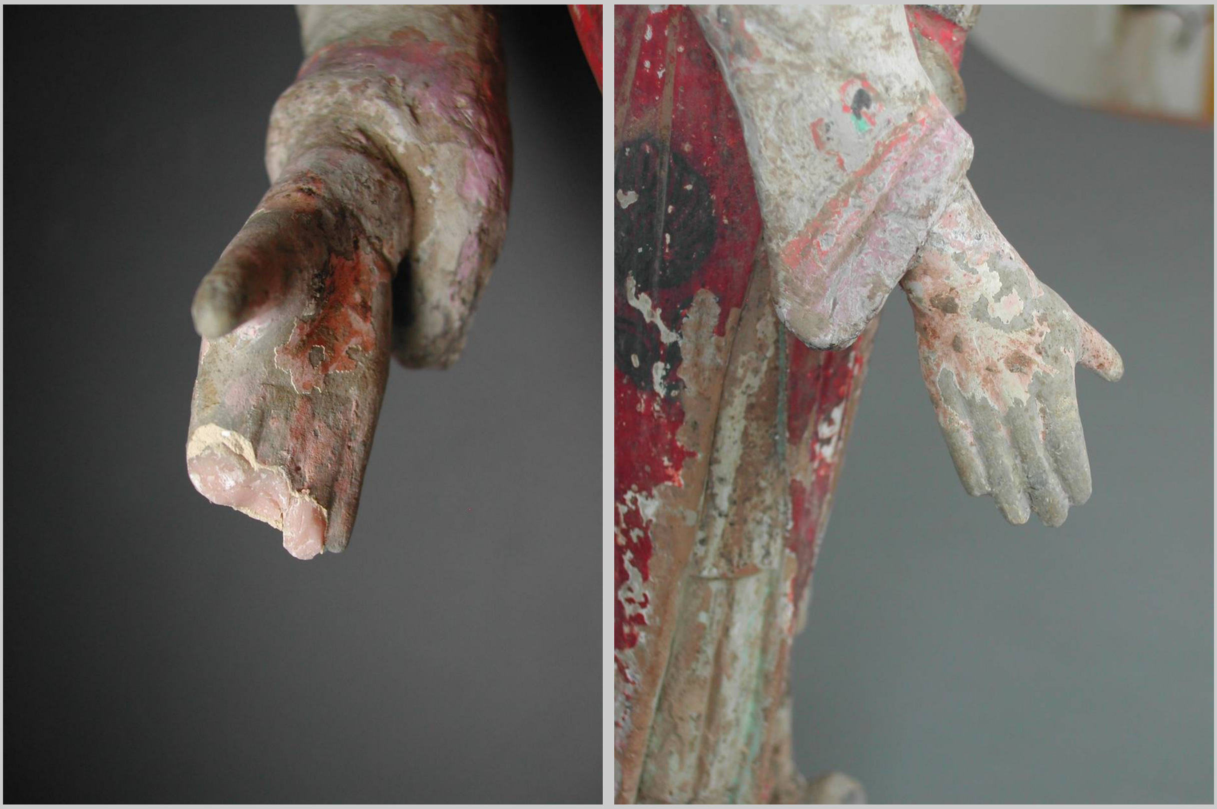


A Court Lady, Tang Dynasty (618 – 907).

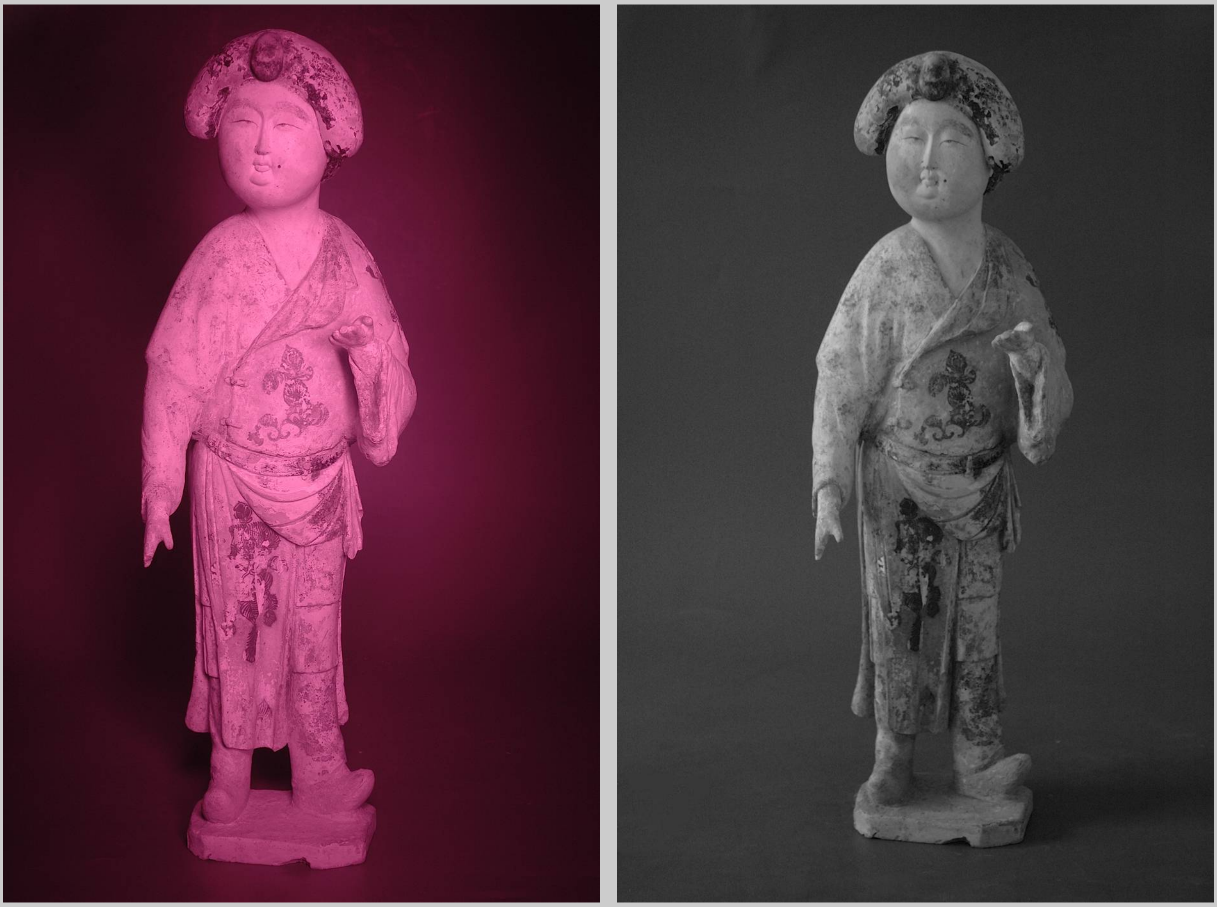
The proper right arm was fractured. This exposed the corroded iron dowel. It also showed that there is an older restoration or reconstruction, covered by a white filler. The arm was joined with a synthetic adhesive, the missing areas filled and colour matched. The figure would benefit from an X-ray to clarify the extent of the reconstruction.



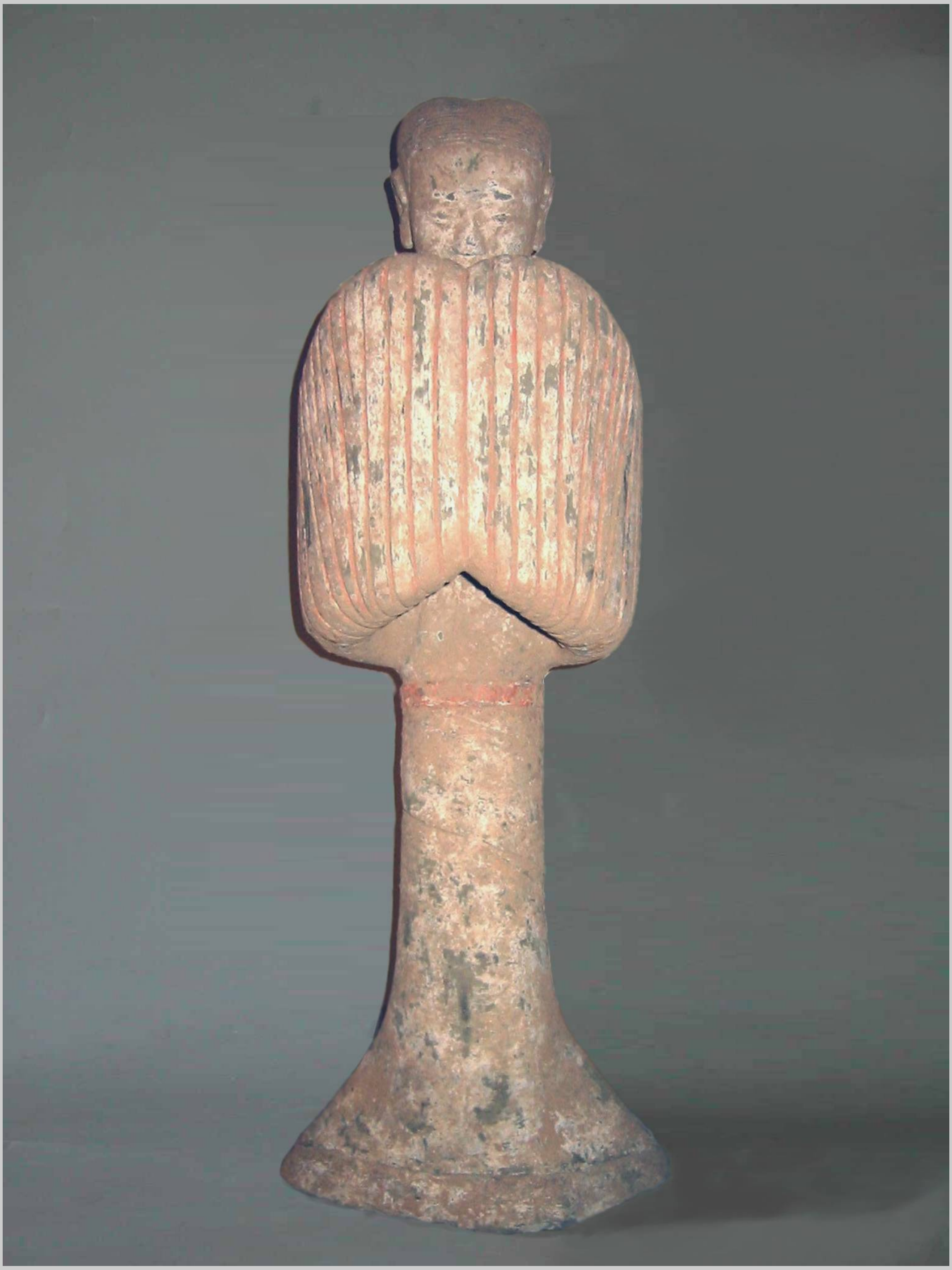
Painted terracotta Court Lady, Tang dynasty (618 to 907 CE). The figure is brightly painted and the figure is extensively covered with pigments. The proper right hand displayed damage. Three fingers were partially missing.



The three fingers of the right hand were made of a resin and appeared as a waxy material, however it was harder. This covered what resembled a calcarious putty. This was covered in what was probably mineral pigments.

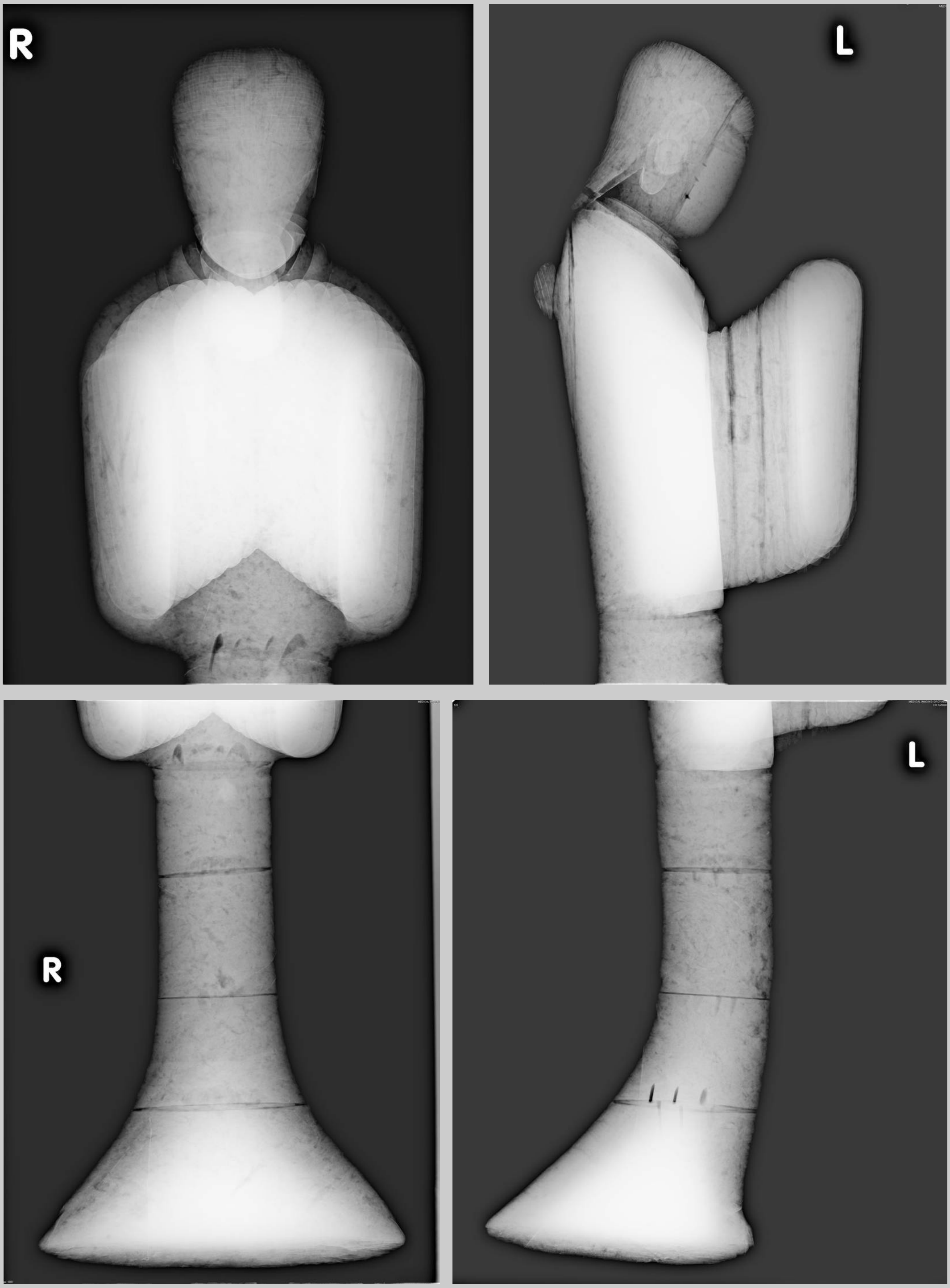


Infrared and ultraviolet imaging of the figure did not show extensive restoration. Taking into account the reconstructed proper right hand, this suggested extensive over-painting with lime-plaster and mineral pigments. The addition of modern materials could only be determined by using X-ray imaging.

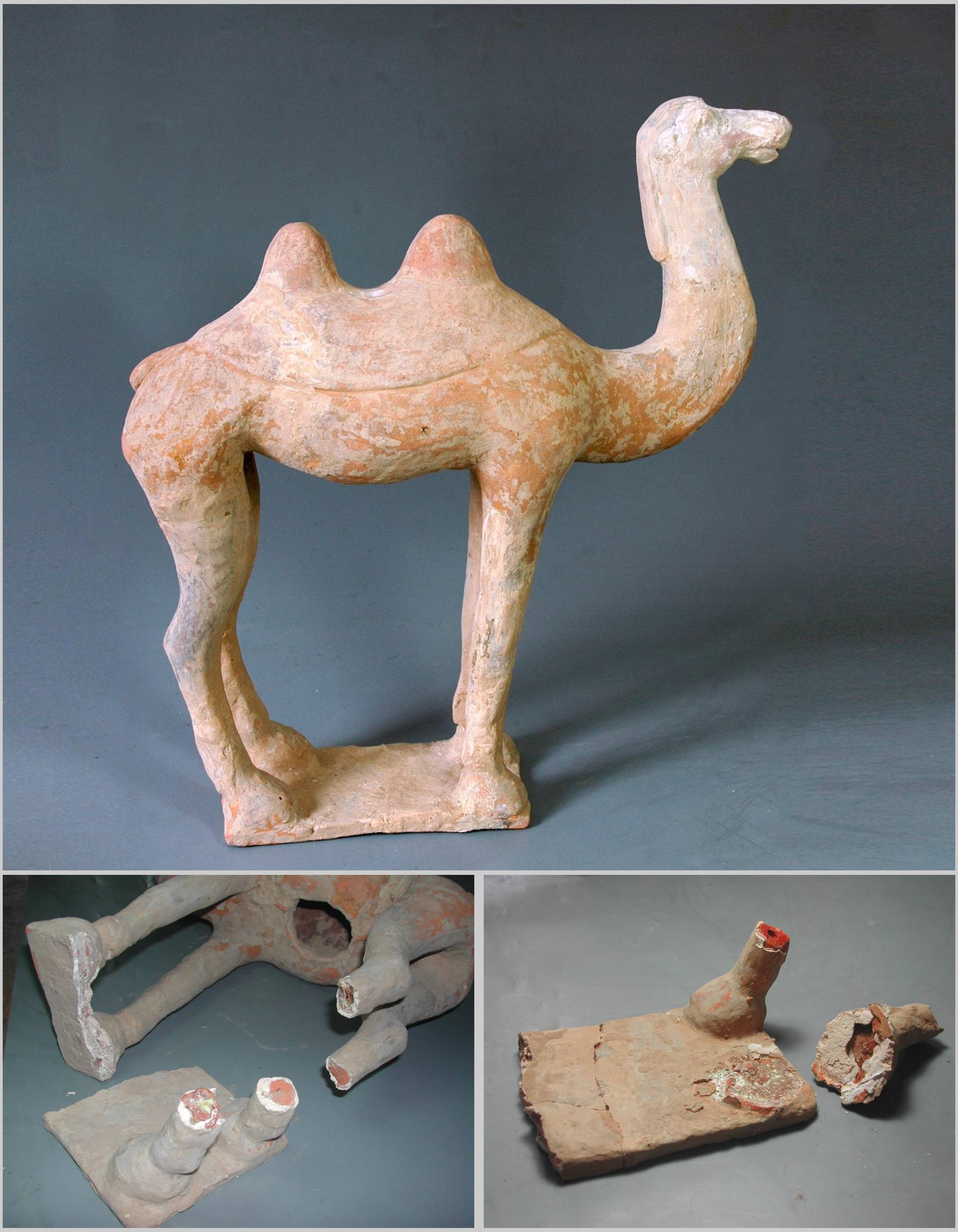


Terracotta figure of a Female Dancer, Han Dynasty, 206 BCE – 220 CE (according to owner and seller).

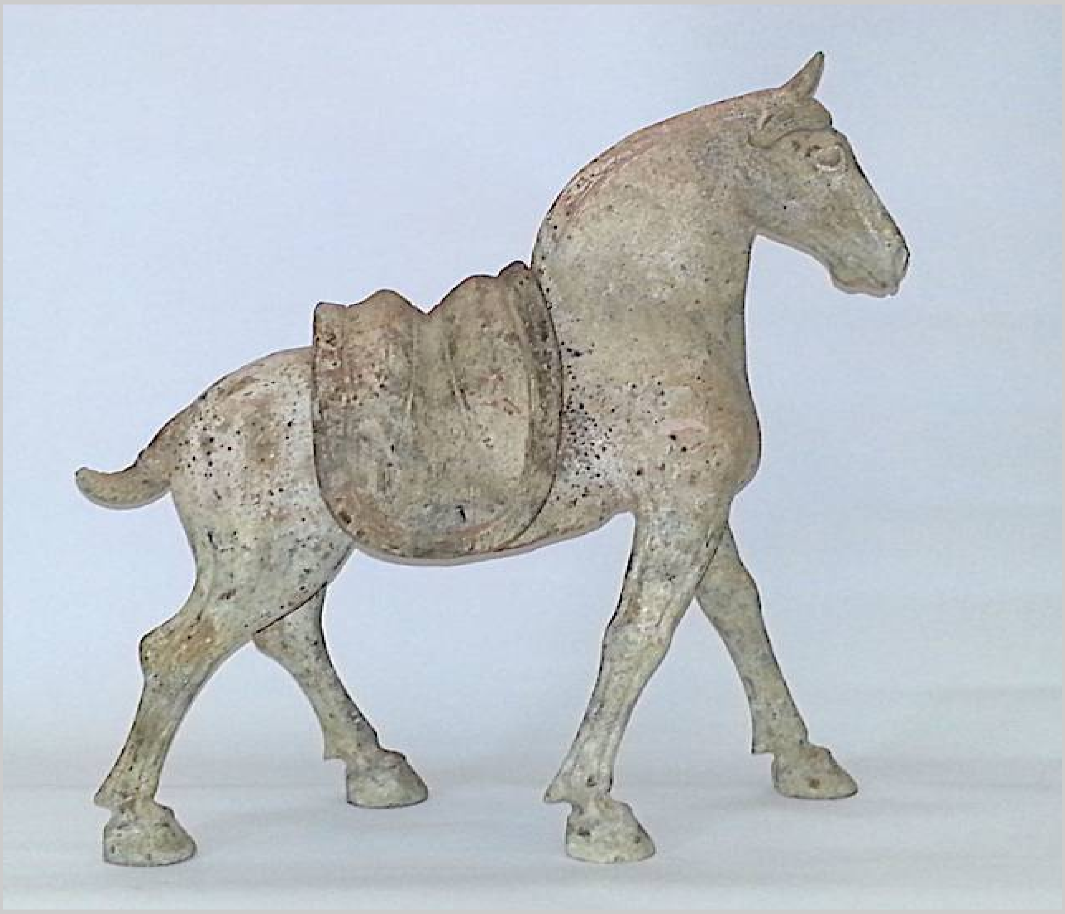
The figure was thermoluminescence tested in Hong Kong and Germany, both results confirmed the age of approximately 2000 years. Infrared and ultraviolet photography did not show any restorations or modern additions. However due to suspicions of the integrity of the sculpture, I undertook x-ray imaging in a hospital facility in Singapore.

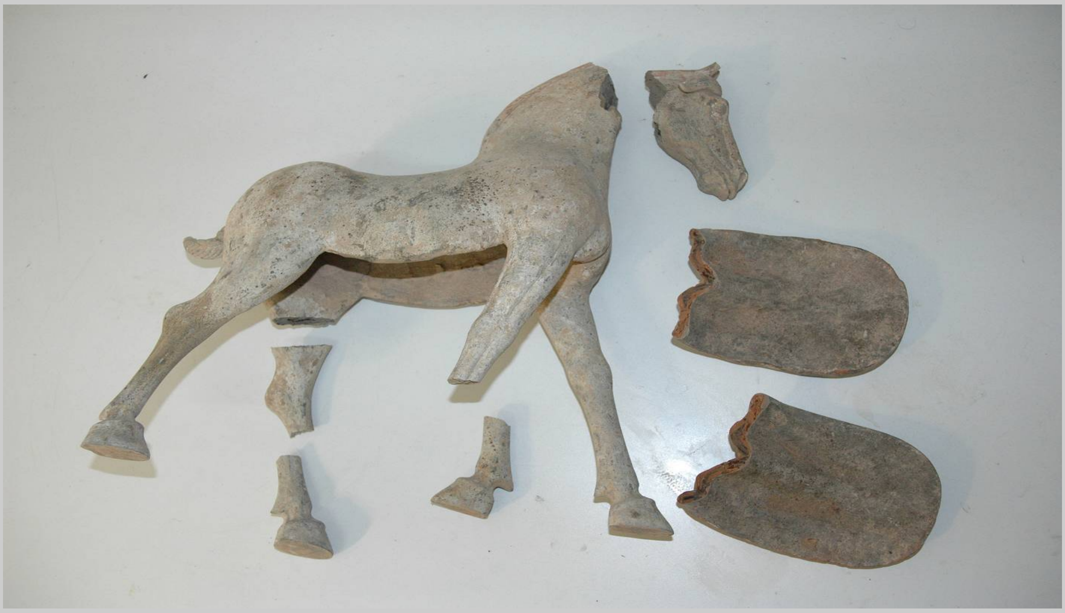


The x-ray images showed that the figure was constructed from various elements and in parts secured with iron pins. The TL test strongly indicated that ancient terracotta was used and the figure then coated with a lime plaster and coloured with mineral pigments.

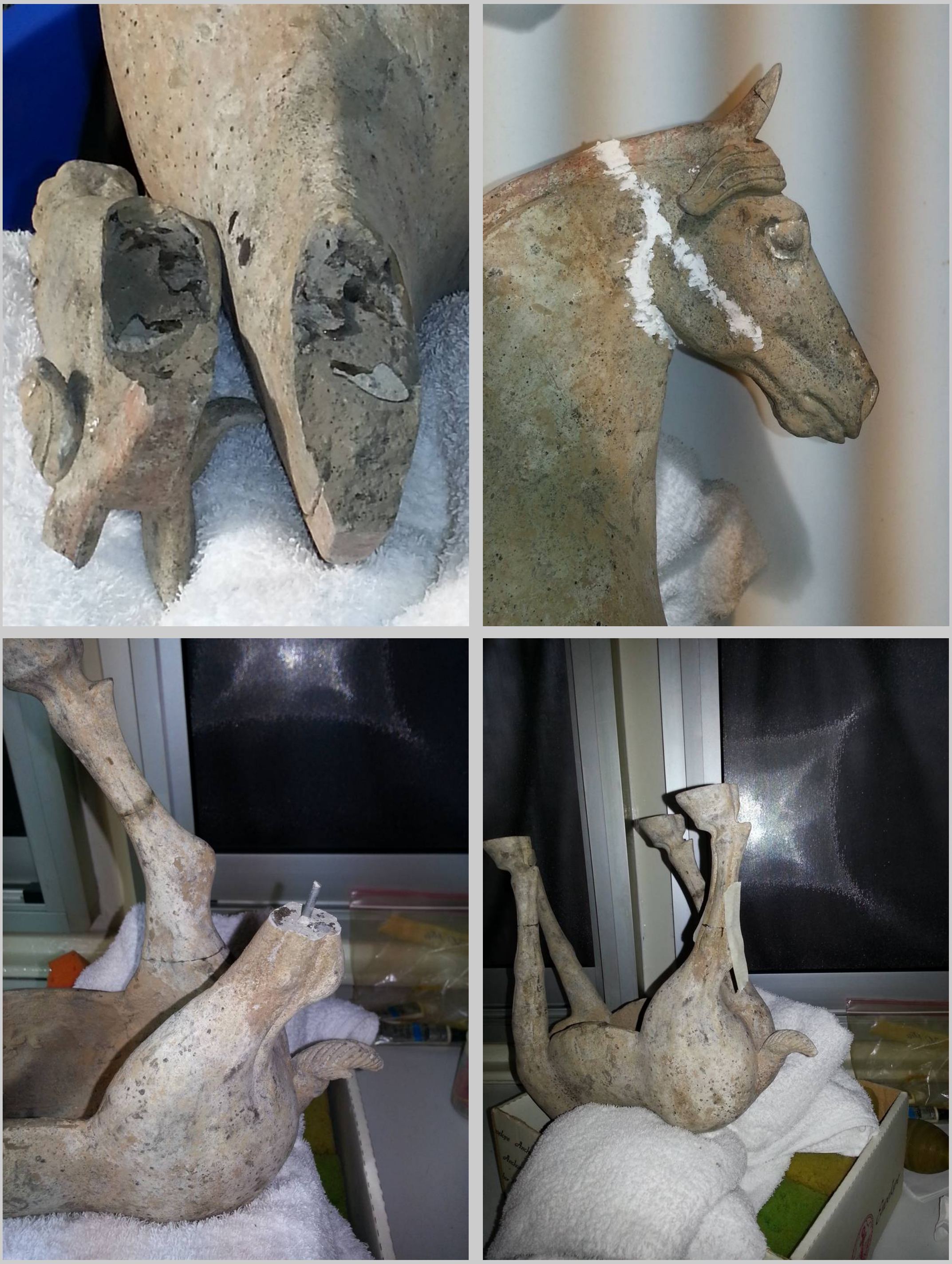


Terracotta Camel. The sculpture was fractured in various parts, exposing its construction. The core was terracotta, which was covered with a white stucco. The modern adhesive under the proper left hind leg indicated a new construction. The camel was reassembled, gap-filled and retouched.

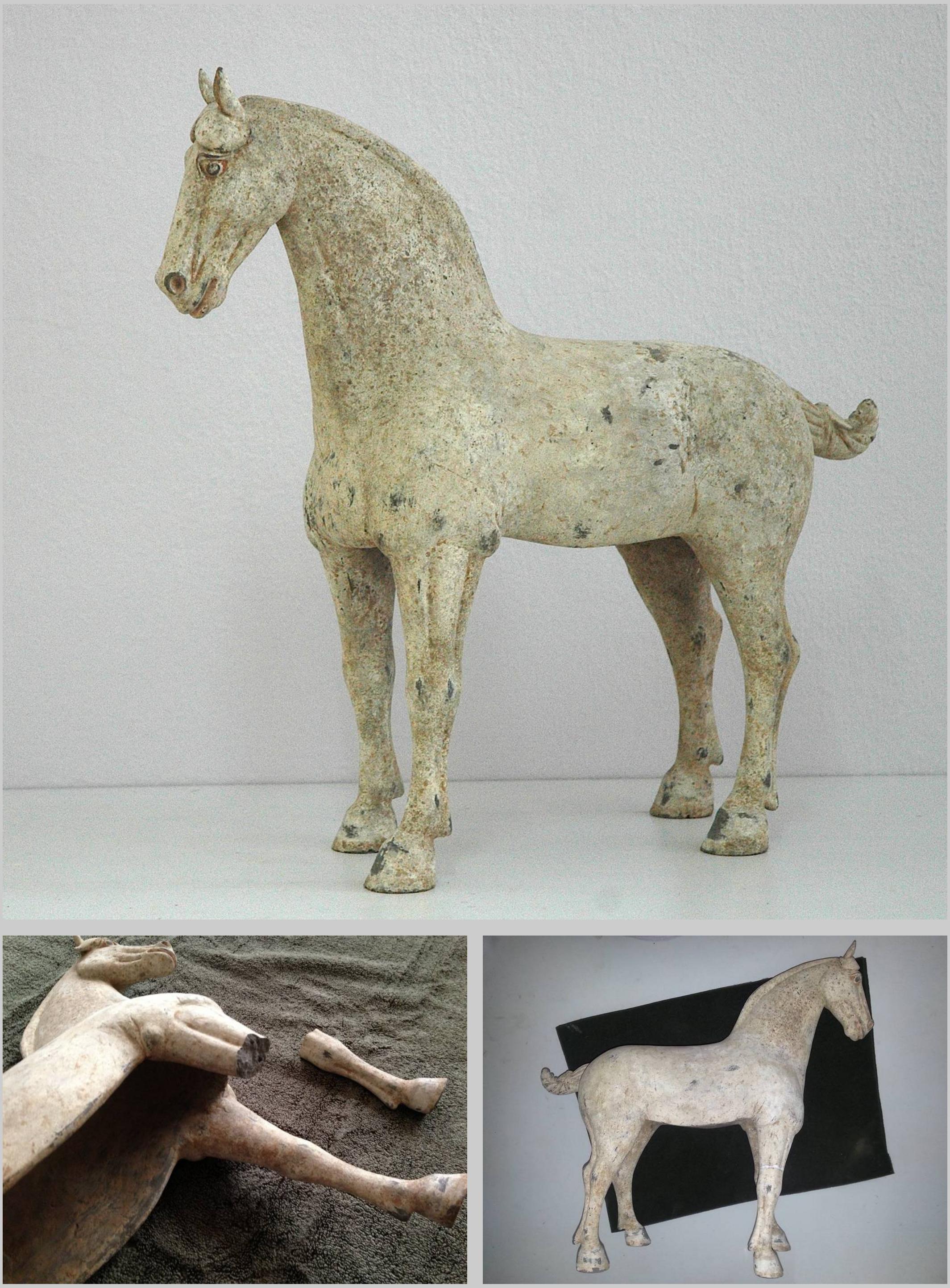




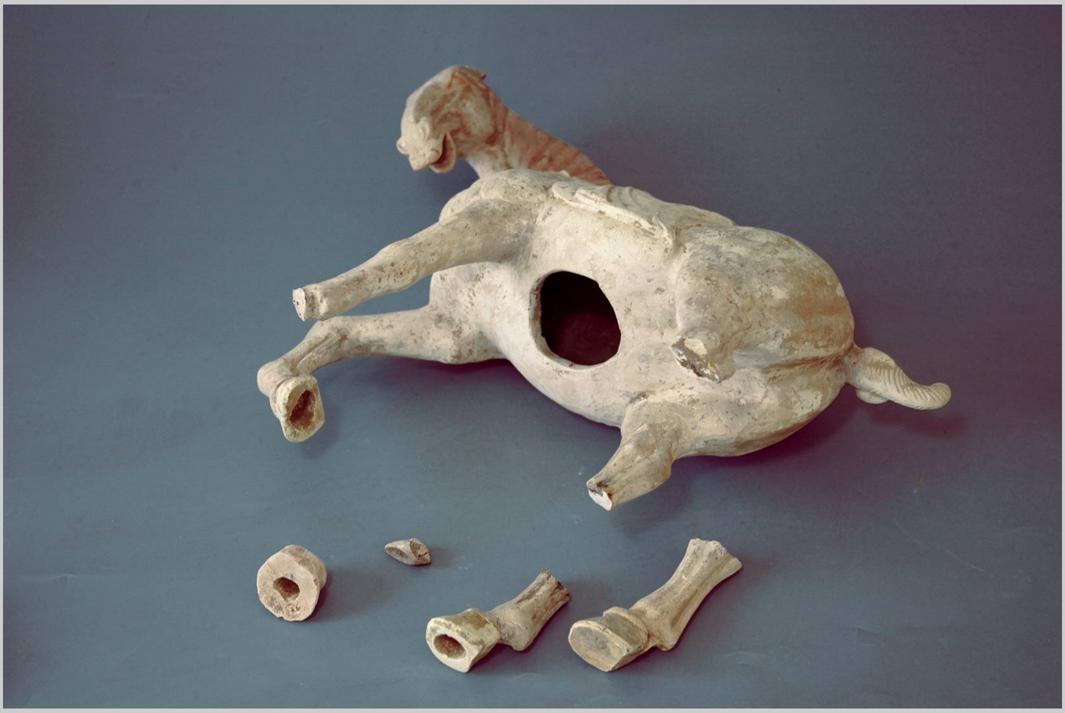
Terracotta horse in Tang style. The horse and the saddle fractured in multiple places. Some of the fractures were previously joined with modern adhesive and camouflaged with paint and pigments.

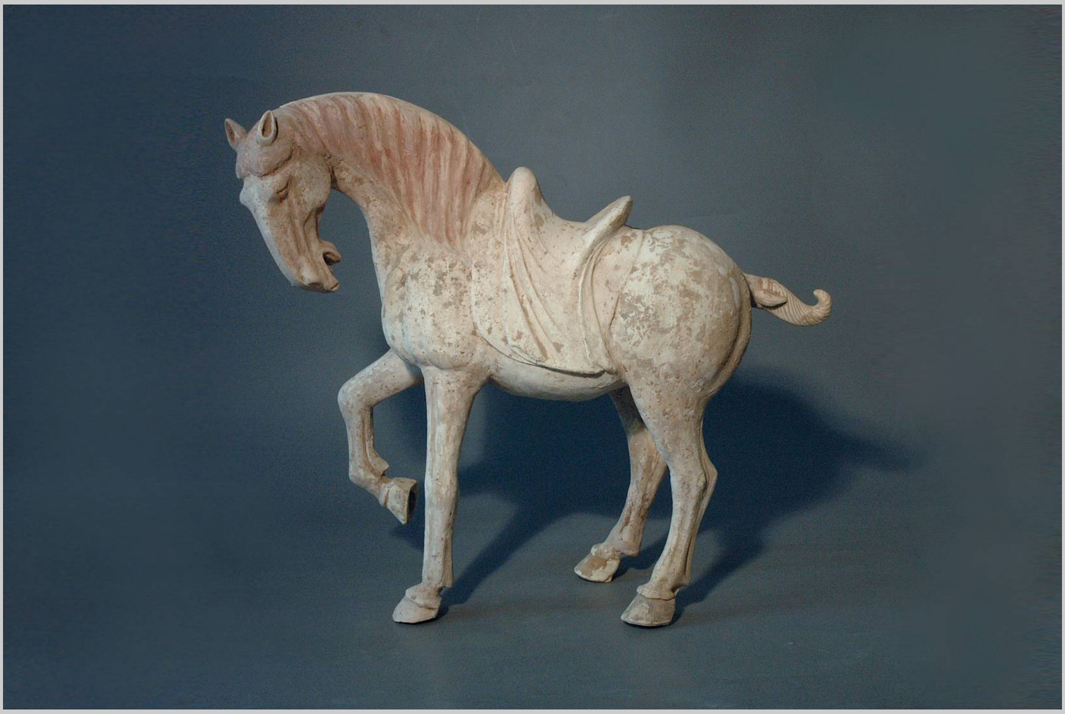


The old restoration was removed, the legs reinforced with stainless-steel pins and glued with a polymer. The gaps filled with a calcium carbonate filler and retouched with acrylic paint.

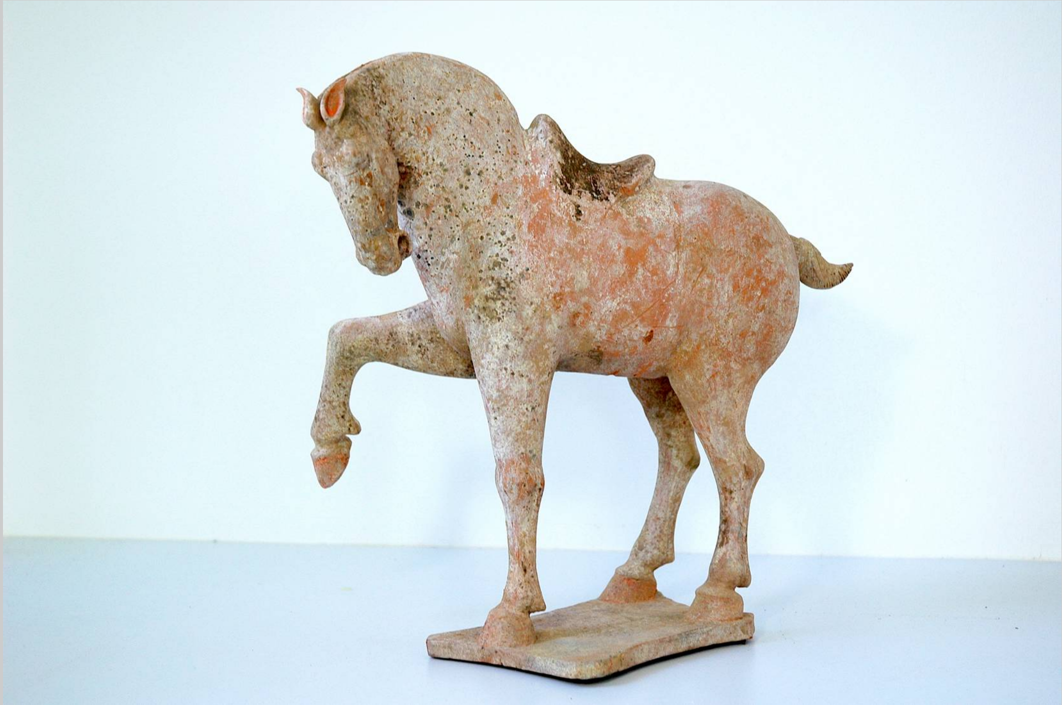


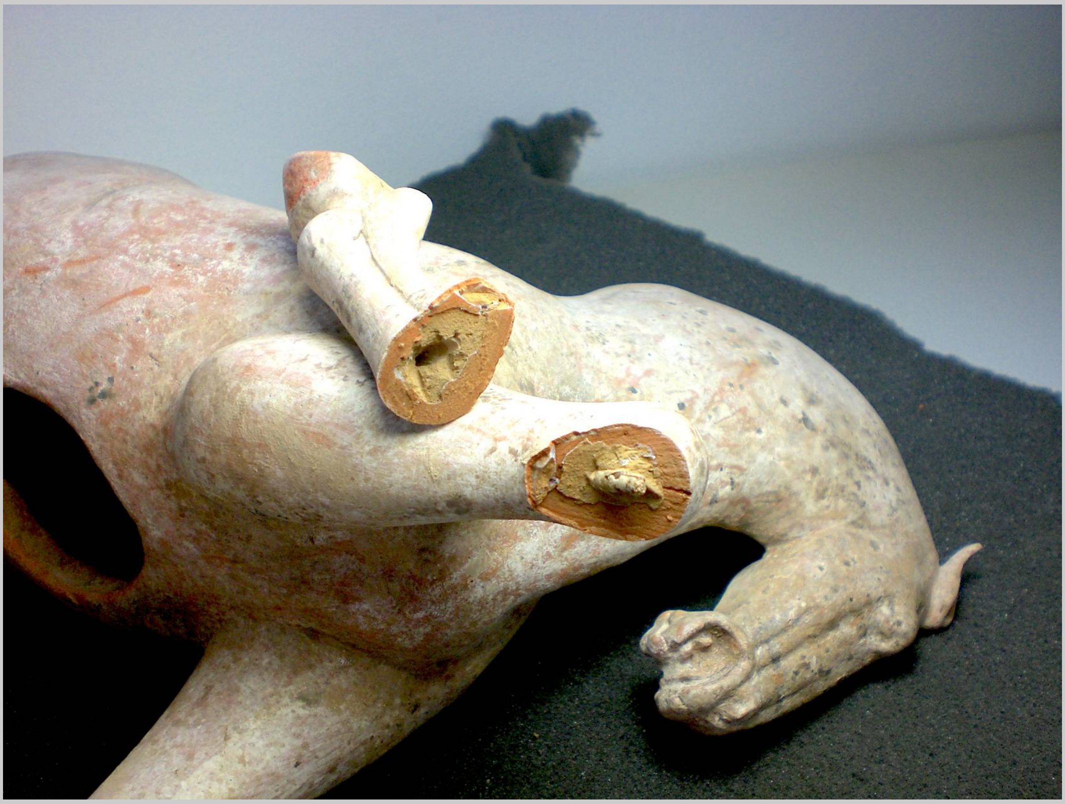
Terra Cotta Tang Horse (618 to 907 CE), the proper right front leg was fractured. The leg was joined to the body using a synthetic resin. The gap was filled with a mineral filler and the fill was colour-matched with mineral pigments after levelling it to the surrounding surface.



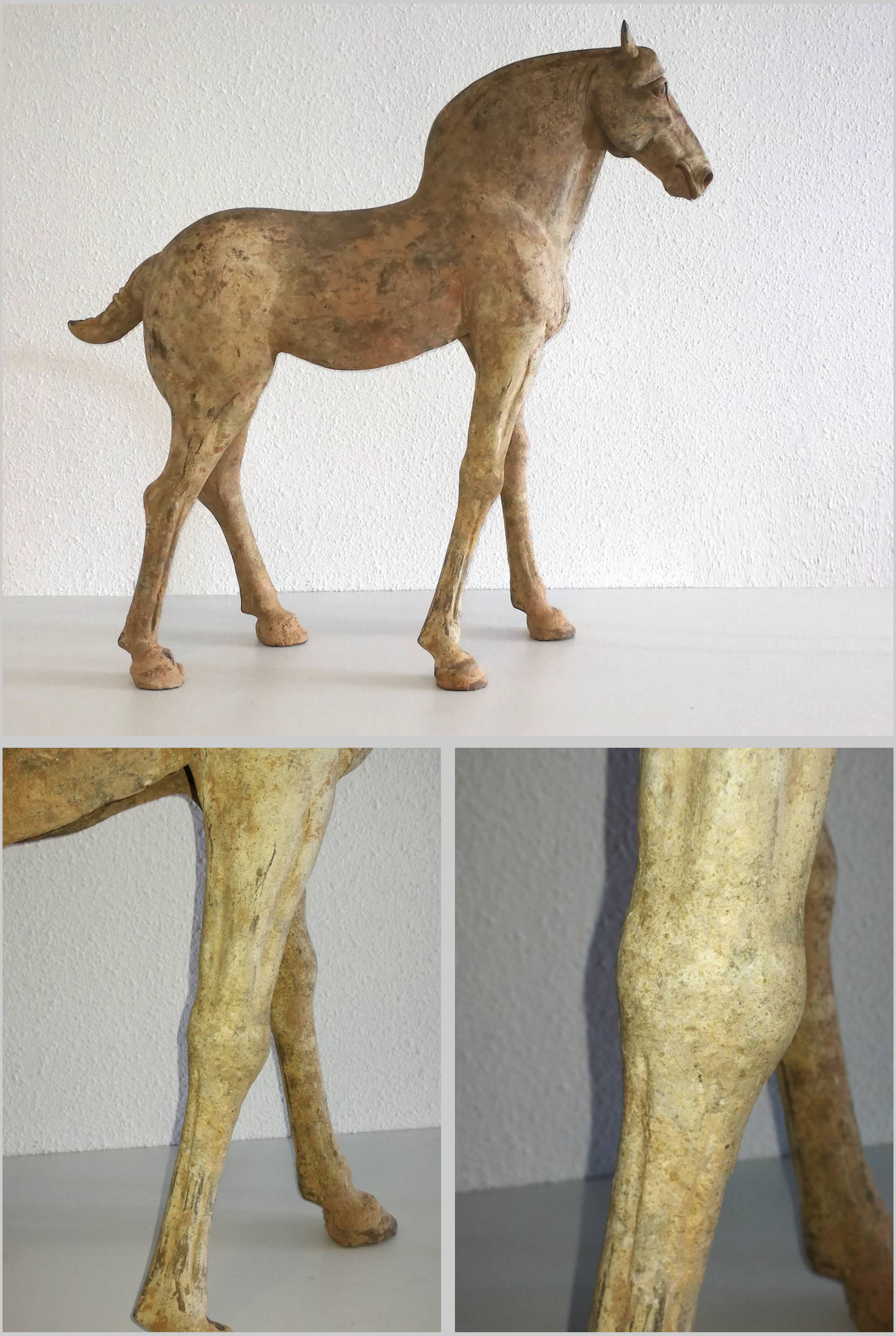


Terracotta Prancing Horse, in Tang Dynasty style (618 to 906 CE). The horse was transported on its acrylic stand. During shipment several restored areas fractured again. The horse was previously restored in multiple areas. The fractures were dowelled to reinforce the weak areas in the legs. The joined fractures were then filled with a calcium carbonate filler and colour-matched with the surrounding areas using acrylic paint.

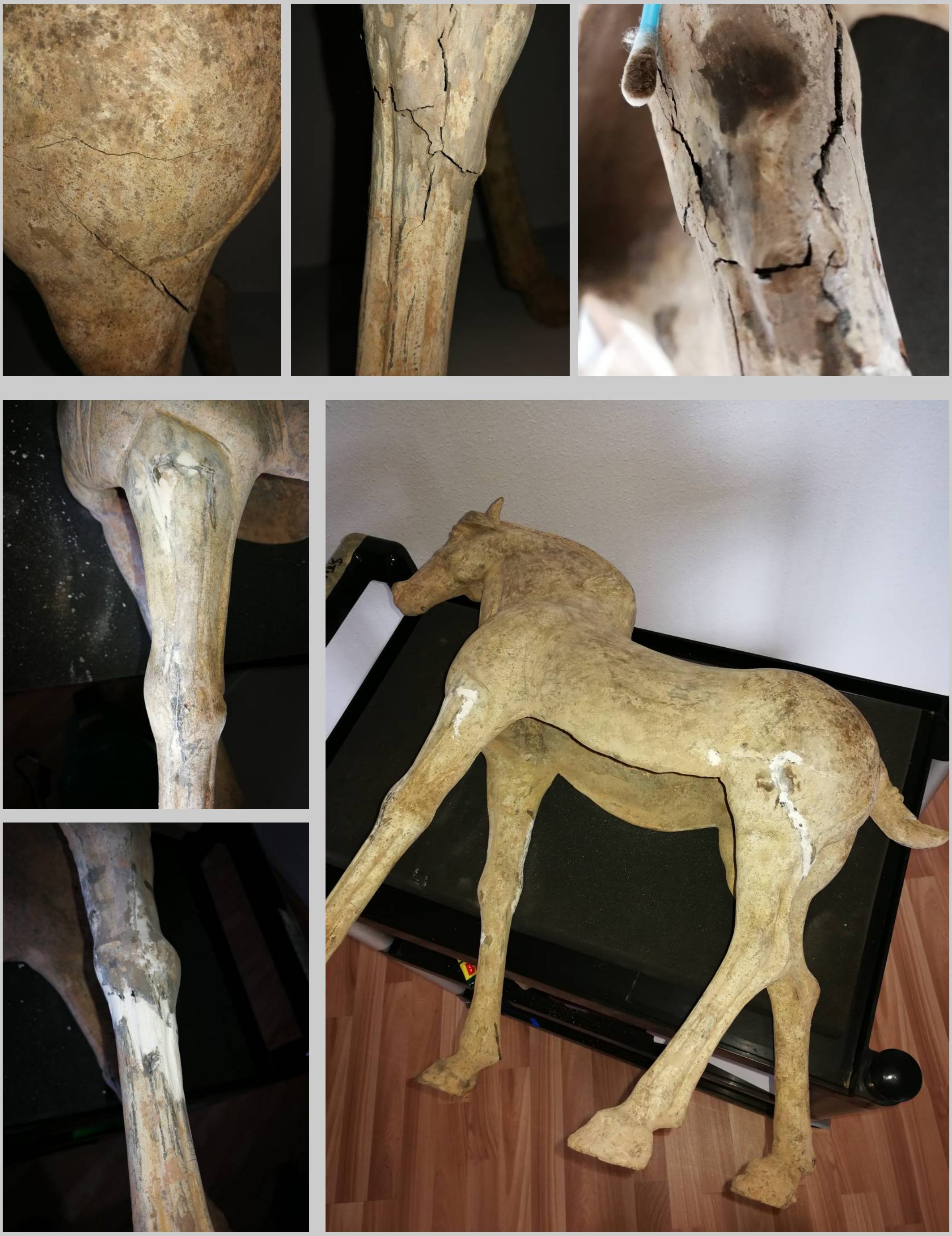




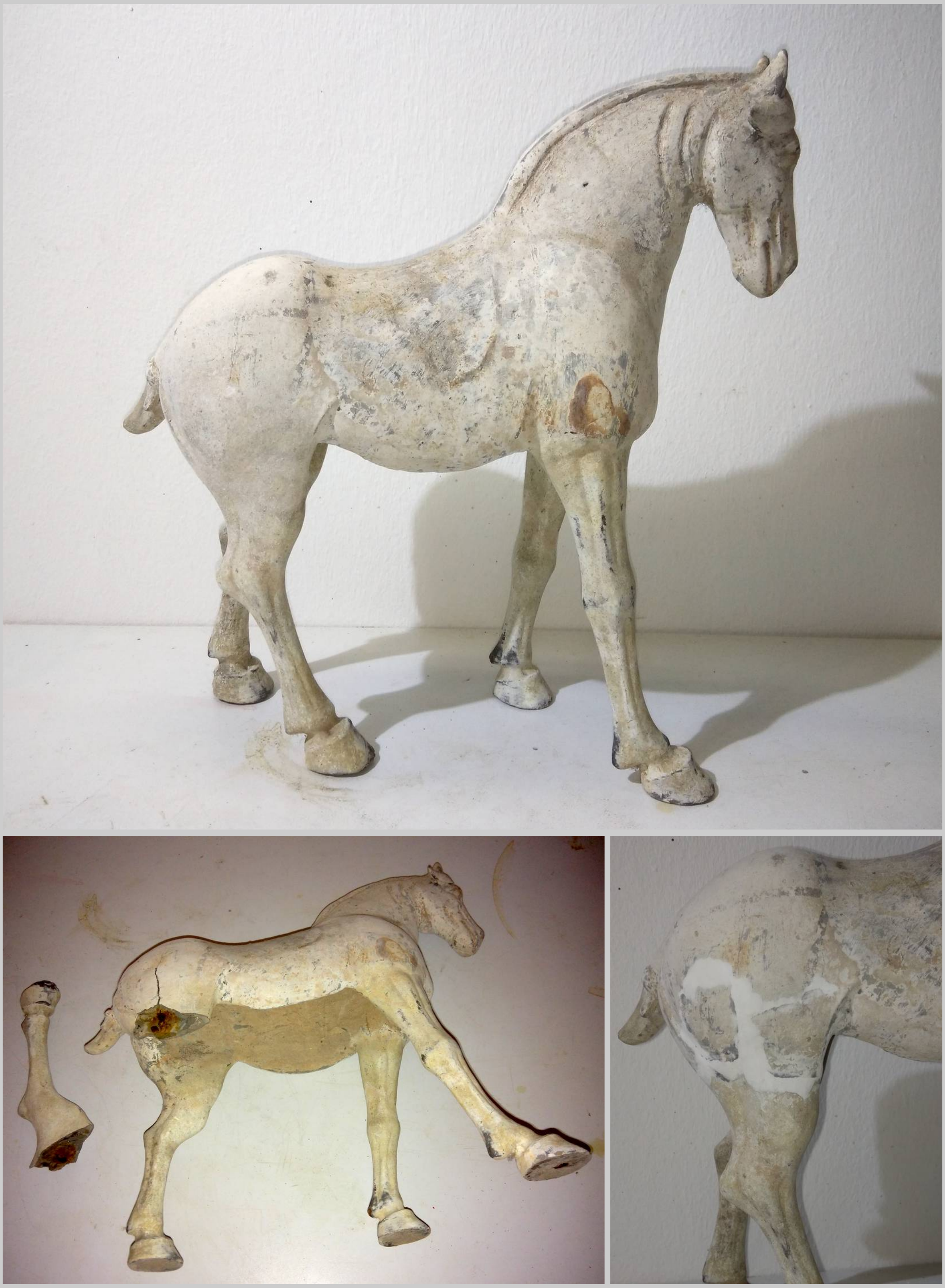
Terracotta Prancing Horse, in Tang Dynasty style (618 to 906 CE). An old join had fractured and needed restoration. The knee on the proper right front leg contained a small dowel and old adhesive. The parallel marks and the clean horizontal cut of the fracture, indicated a modern cut. From my experience I am aware that many 'antique' sculpture reproductions have been produced using old terracotta (bricks). As a result, thermoluminescence testing will indicate an ancient firing of the clay body.



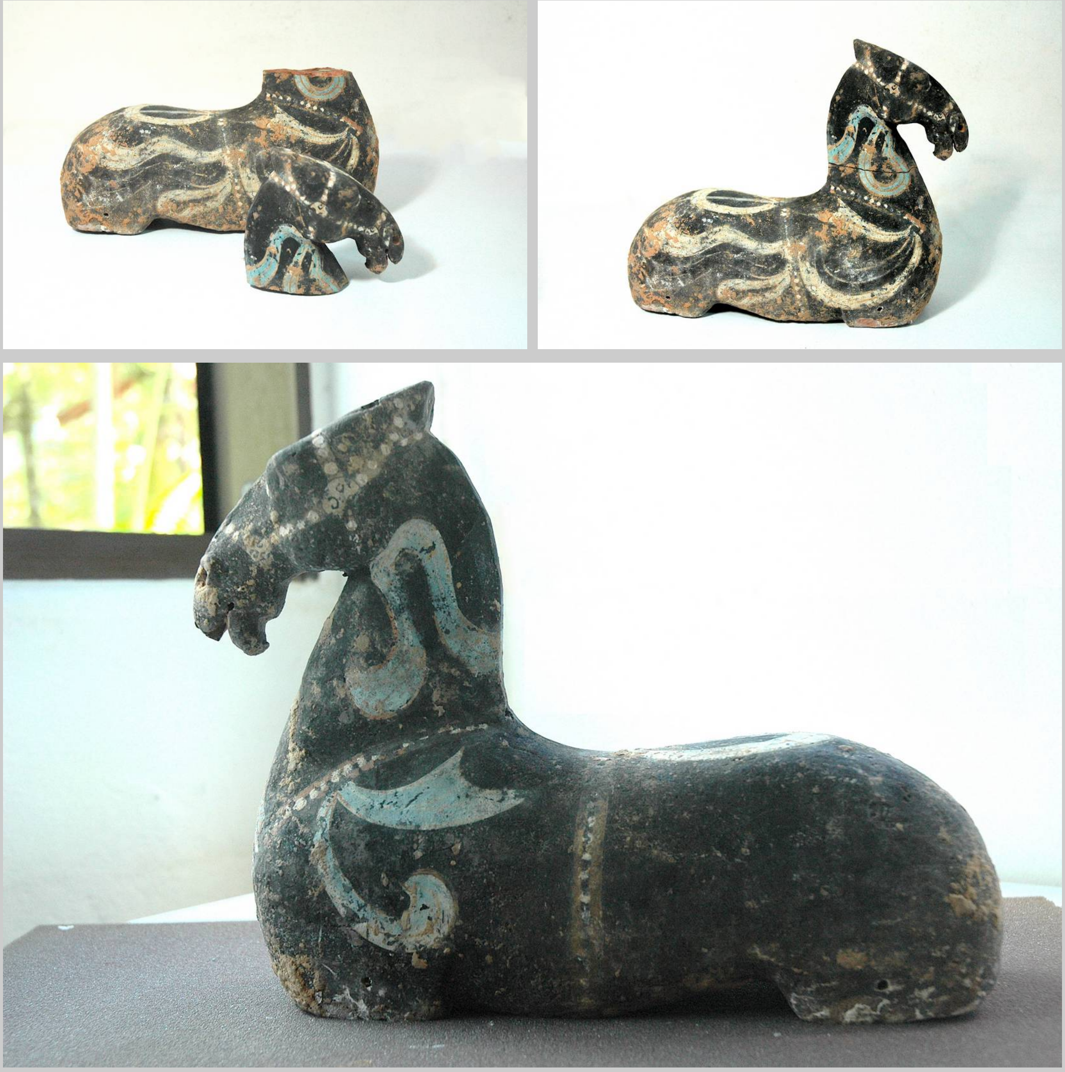
Tang dynasty terracotta Horse, 618 to 907 CE. The images above are after restoration.



Tang horse during restoration. The legs displayed severe fissures due to expanding iron dowels from an old restoration. It was not possible to extract the old dowels or reverse the restoration, without causing loss of original material. The cracks were infilled with a polymer resin. The cracks were filled with a calcium carbonate filler and the White filler retouched with acrylic paint.

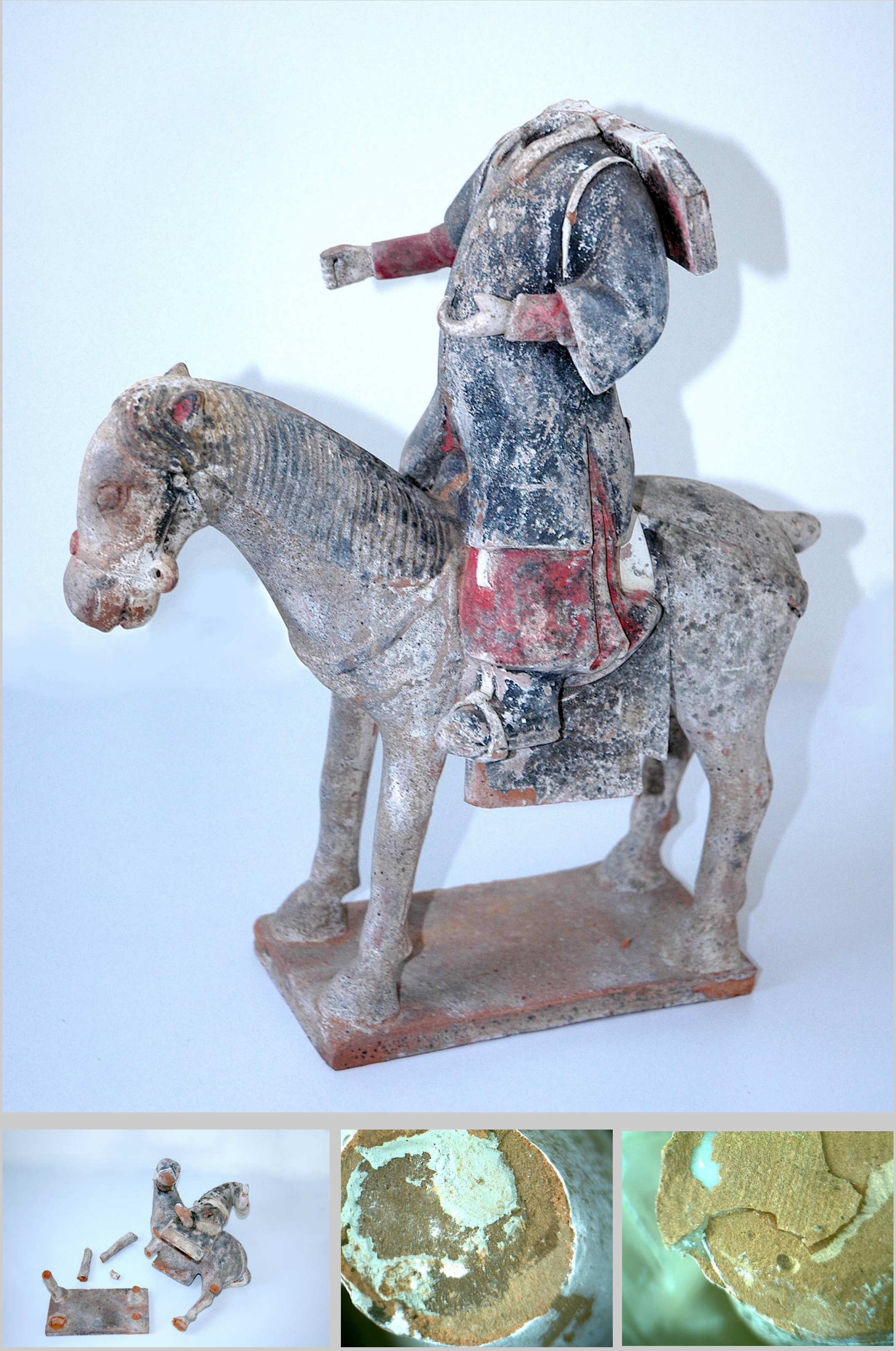


Terracotta Tang Horse (618 to 907 CE), the leg had been previously secured with an iron dowel. This rod had corroded and expanded. This caused the whole proper right hind leg to crack and fracture. The leg was consolidated with a synthetic resin. The gaps were filled with a calcium carbonate filler, levelled and colour matched with the surrounding surface, using mineral pigments containing paint.

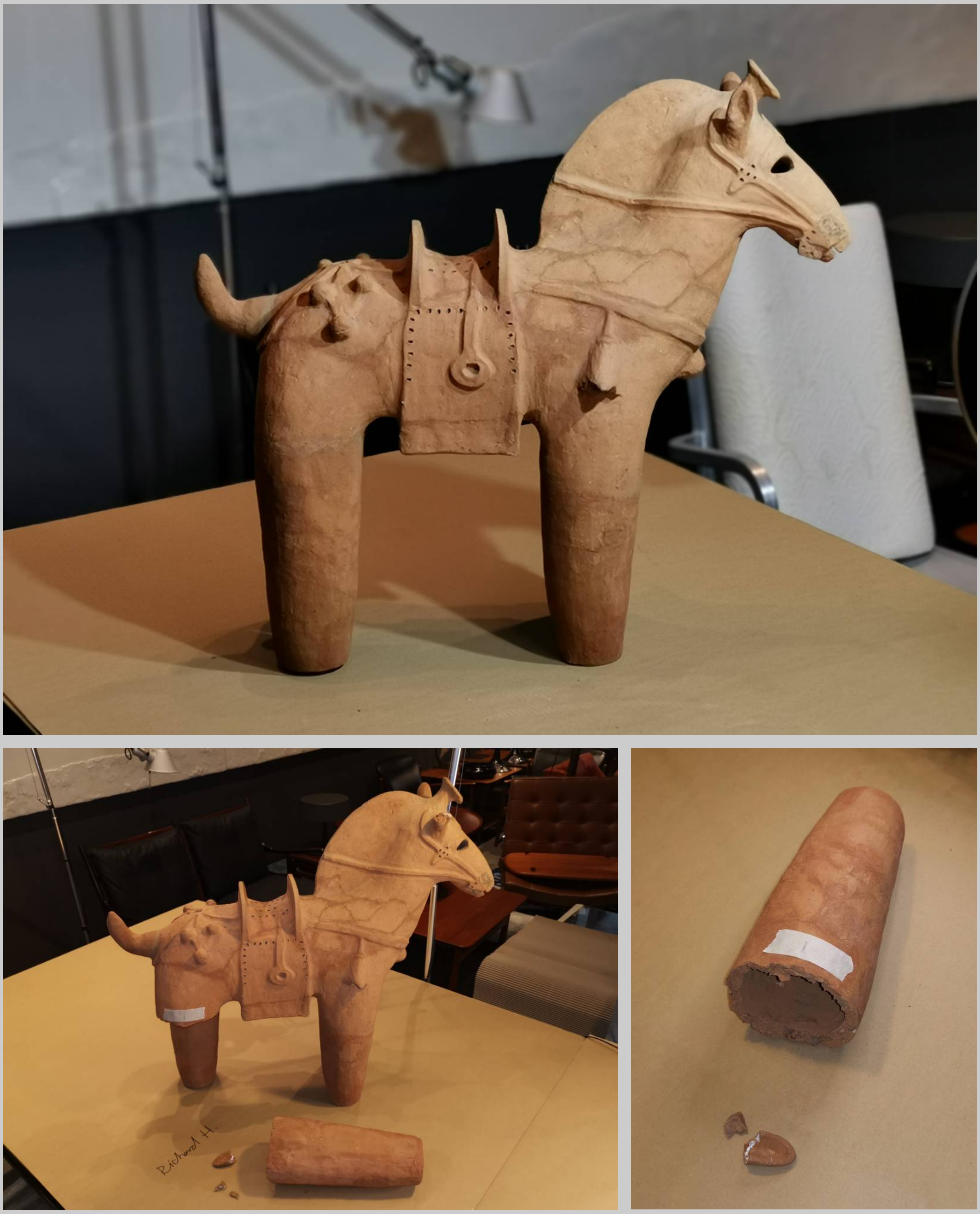


Black terracotta Han Dynasty horse (206 BCE 220CE).

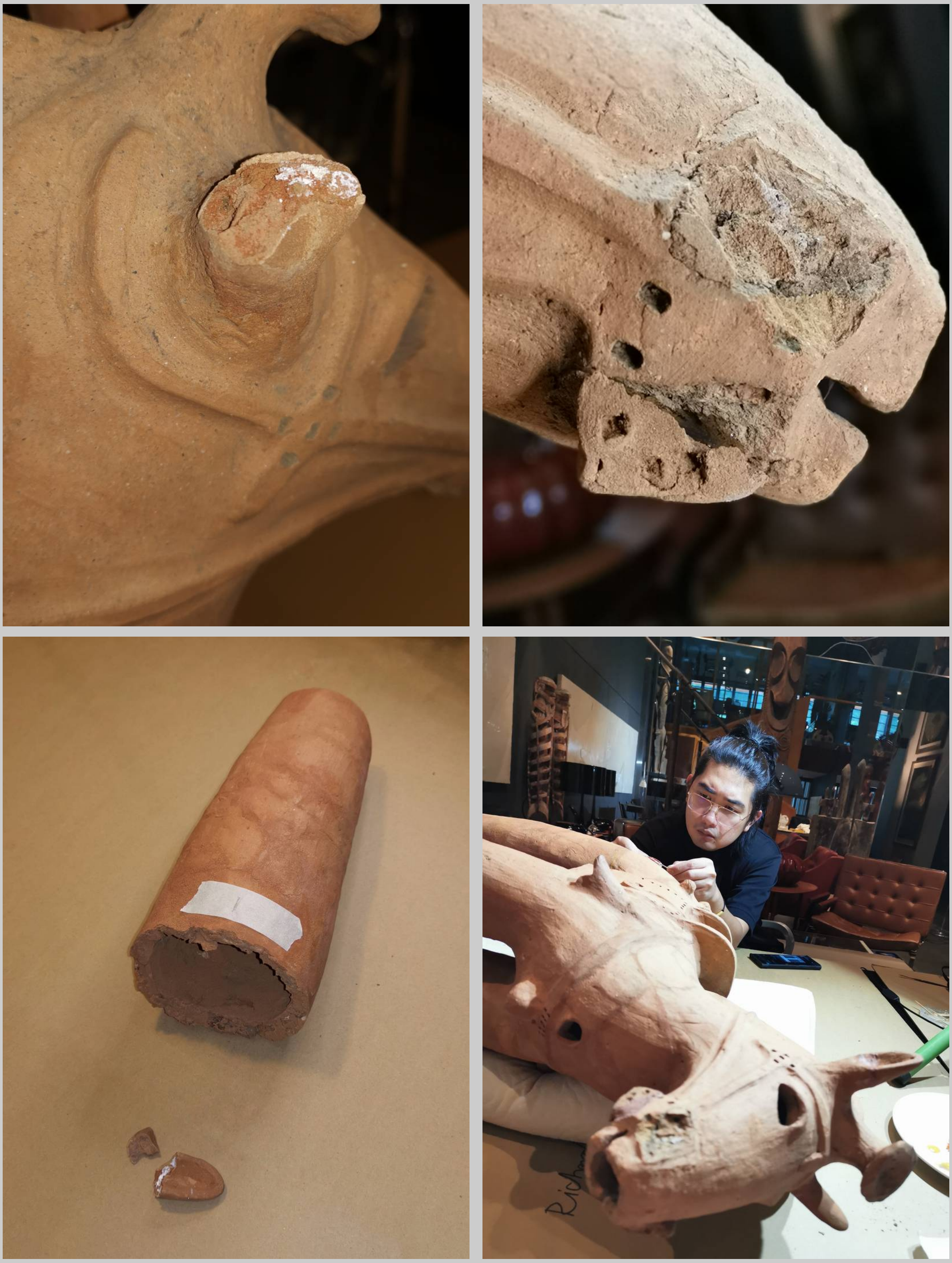
The head had a recent fracture and repair that failed. The fractures were solvent cleaned and joined with a synthetic polymer adhesive. The gaps were filled with a calcium carbonate containing filler and the fill colour matched using acrylic colours.



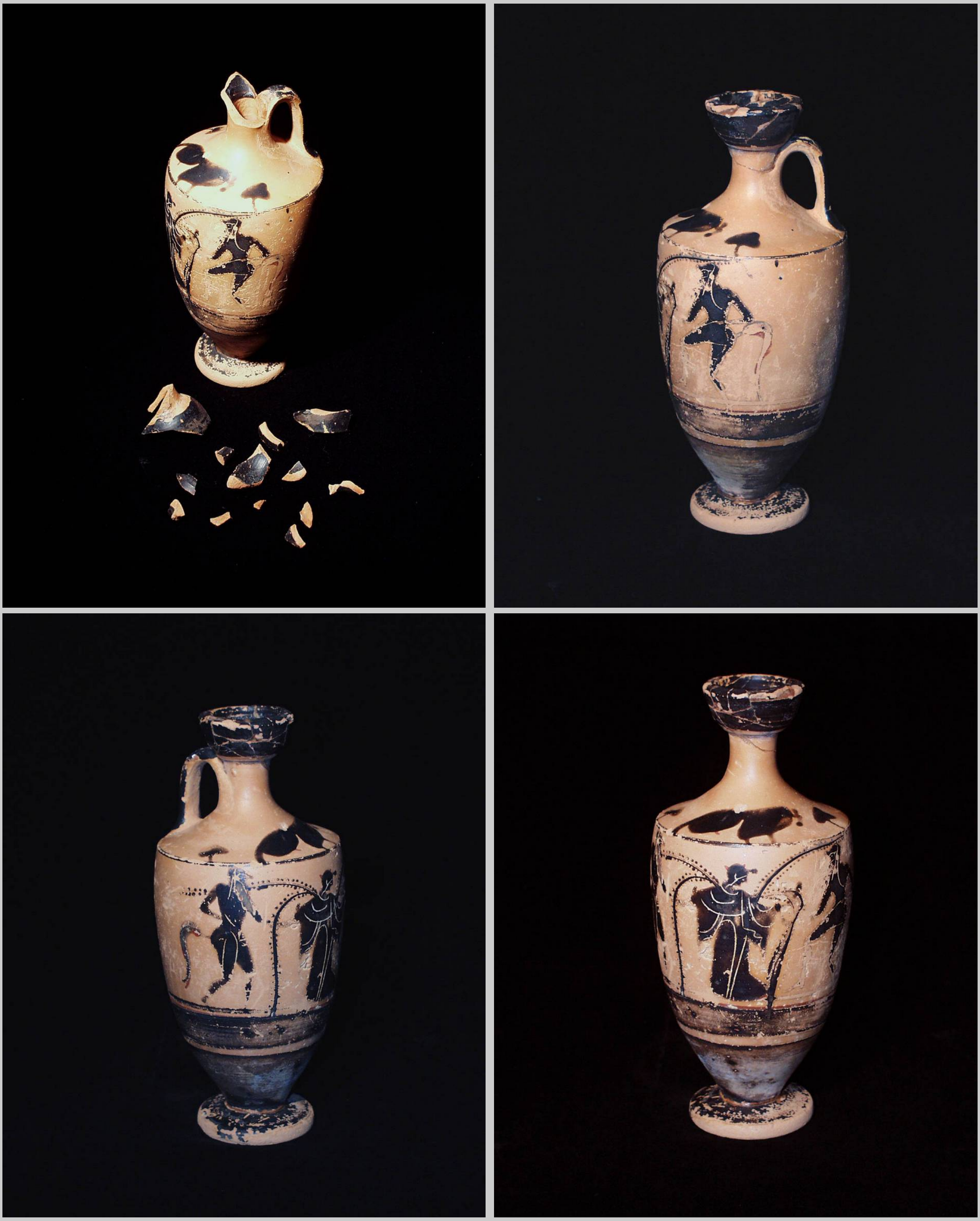
Terracotta rider on horseback, Ming dynasty (1368-1644 CE). The legs were fractured in various areas. Some of the fractures displayed a mechanically manipulated surface that was previously joined. The old restoration was removed, the fragments joined, gap filled and colour matched.



Terracotta Horse, Haniwa culture, Japan, Kofun Period (~ 250 – 552 CE). The sculpture was very fragile, and the ceramic very crumbly It had been previously restored. The proper right hind leg and both ears had recently fractured.

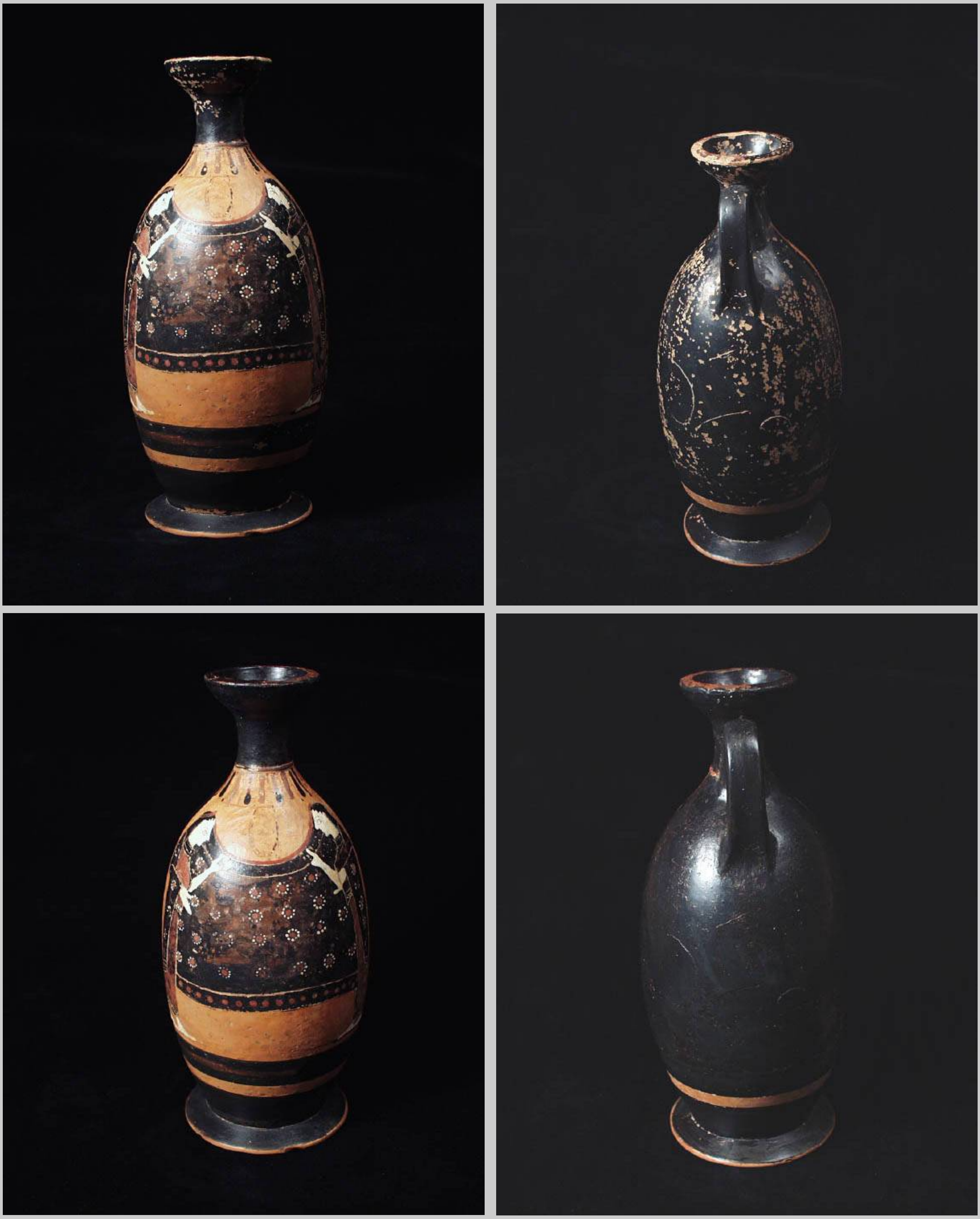


The fractures were cleaned from old adhesive. The fragments were joined with a synthetic adhesive and gap filled with a calcium carbonate filler. The fills were colour matched with acrylic paint.

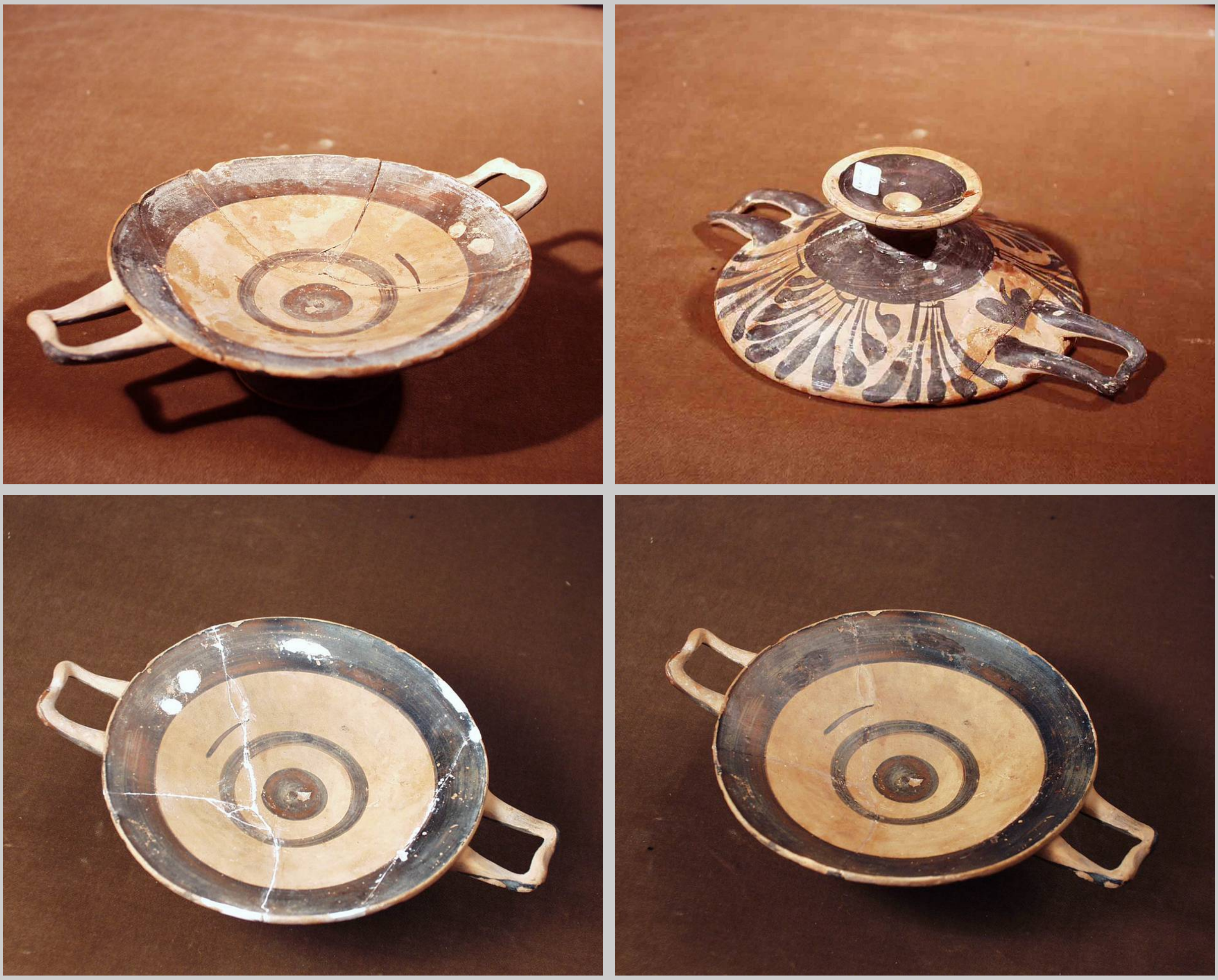


Attic small black-figure lekythos 500 BCE,(11.8 cm). Dancing maenad flanked by two nude dancing satyrs.

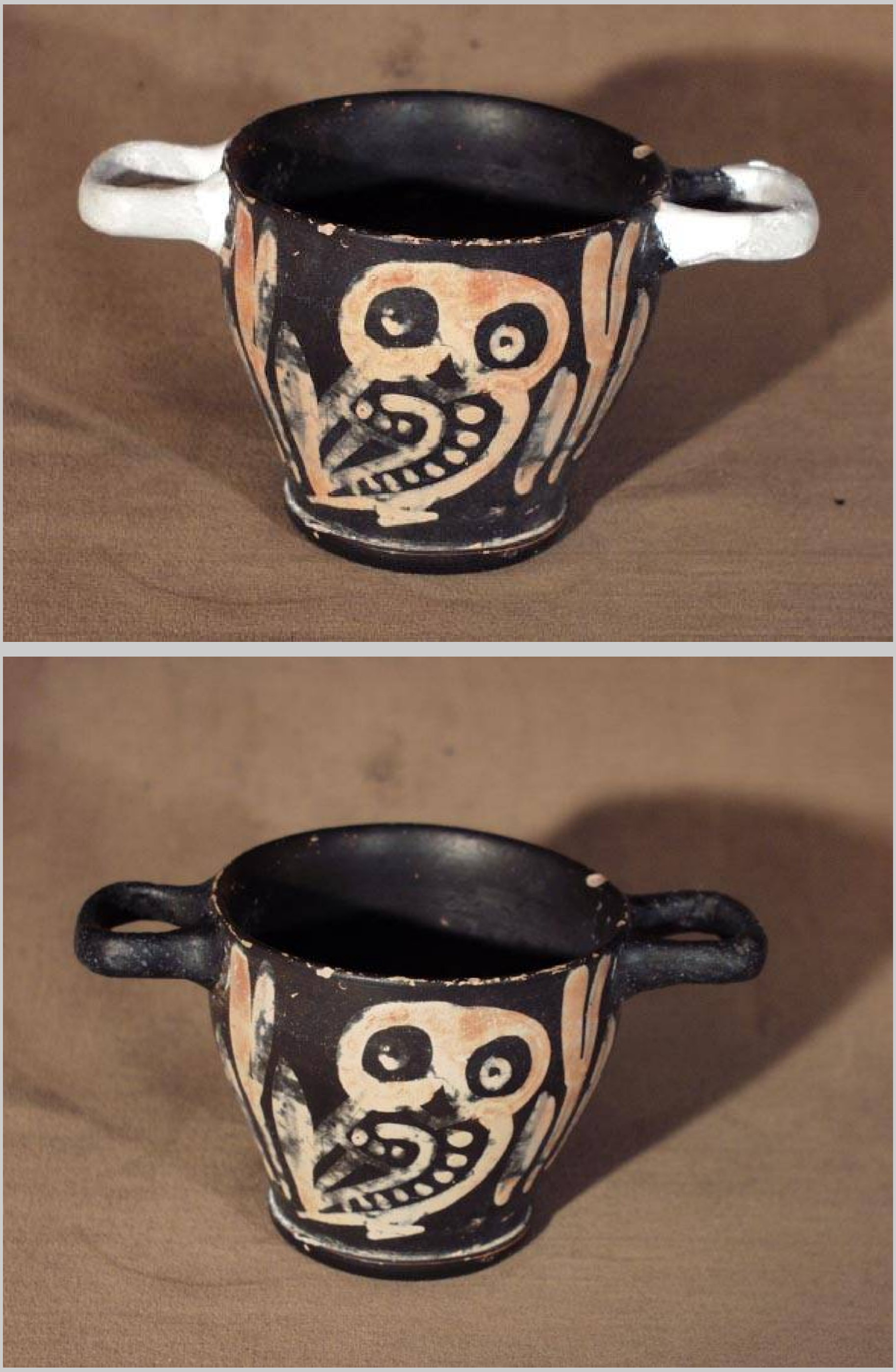
The drawing was very deteriorated due to soluble salts. The lip was fragmented and previously joined incorrectly. The lekythos was disassembled and desalinated. The cleaned fragments were joined with a reversible adhesive, the missing areas were filled with a calcium carbonate filler and retouched with acrylic colour.



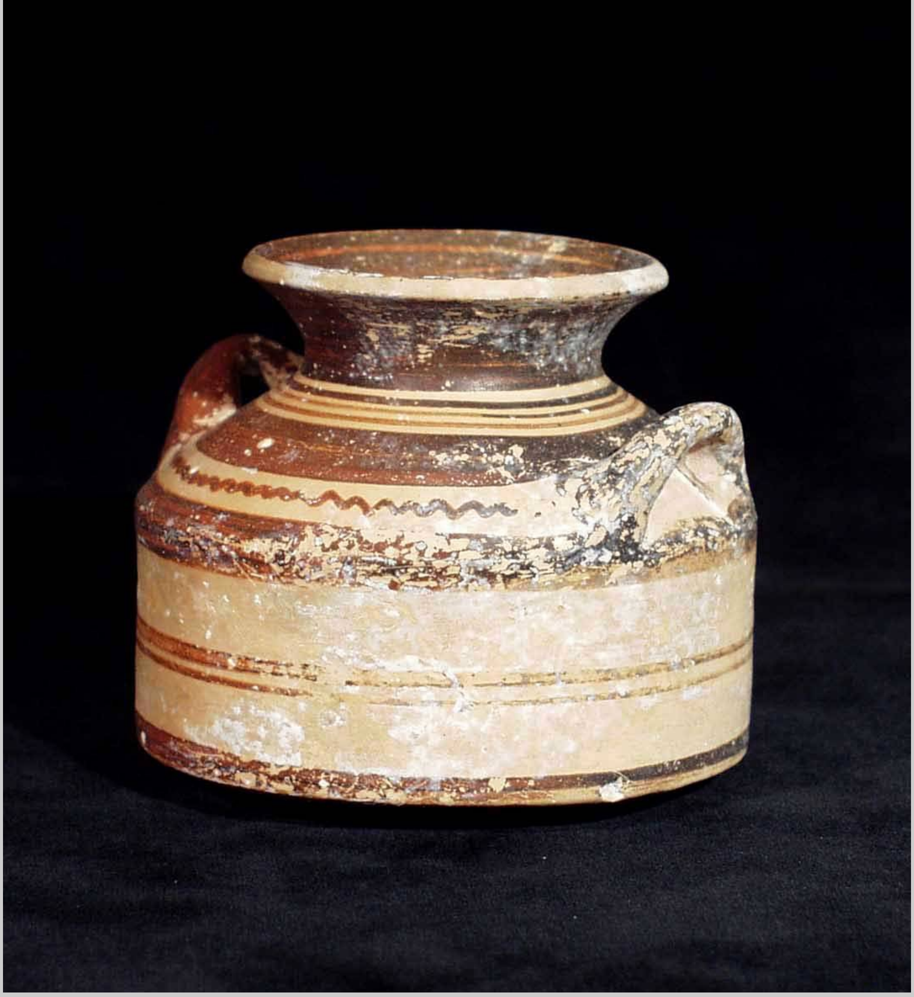
Greek terracotta Lecythos 500BCE. The black glaze was slightly deteriorated and was retouched using acrylic colours, there was only minimal over-painting. This restoration is completely reversible and allows visual integrity of the dark areas.

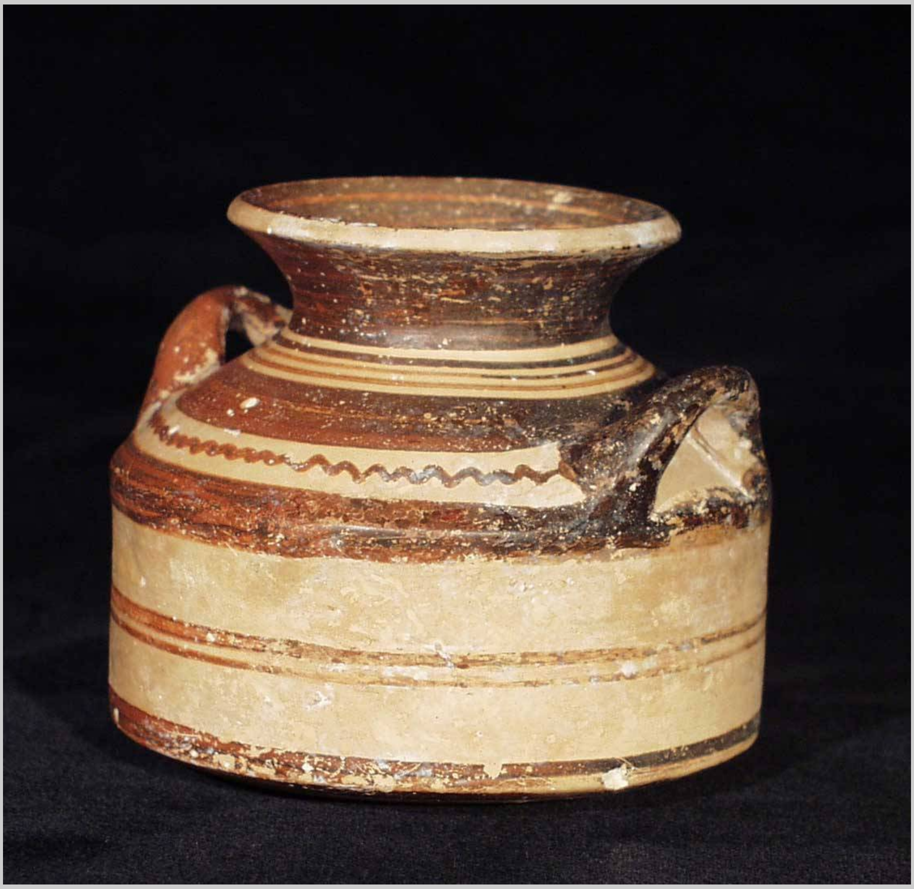


Small terracotta Kylix. The ceramic was previously restored. The old joins were taken apart and all the old restoration removed. The cleaned fragments were then joined with a solvent based adhesive. The gaps were filled with a calcium carbonate based paste and retouched using an acrylic paint.

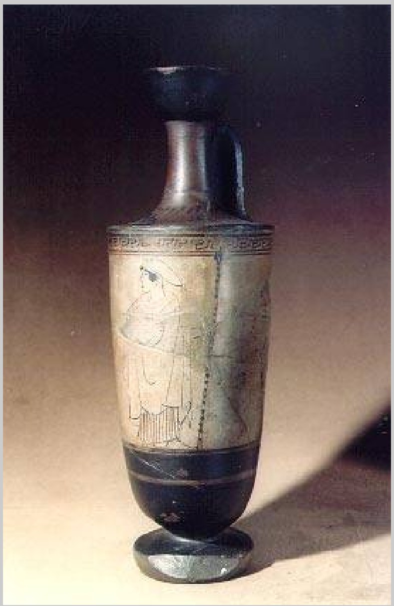


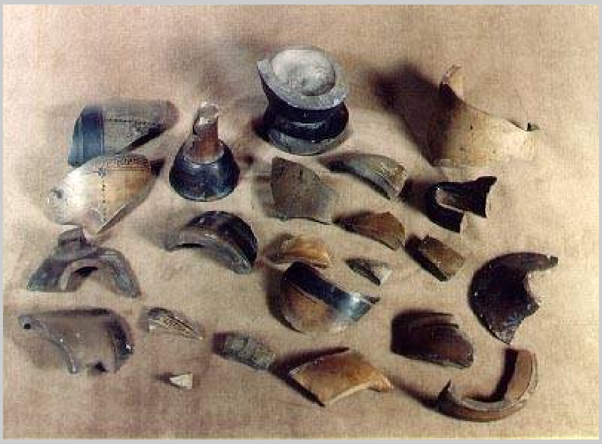
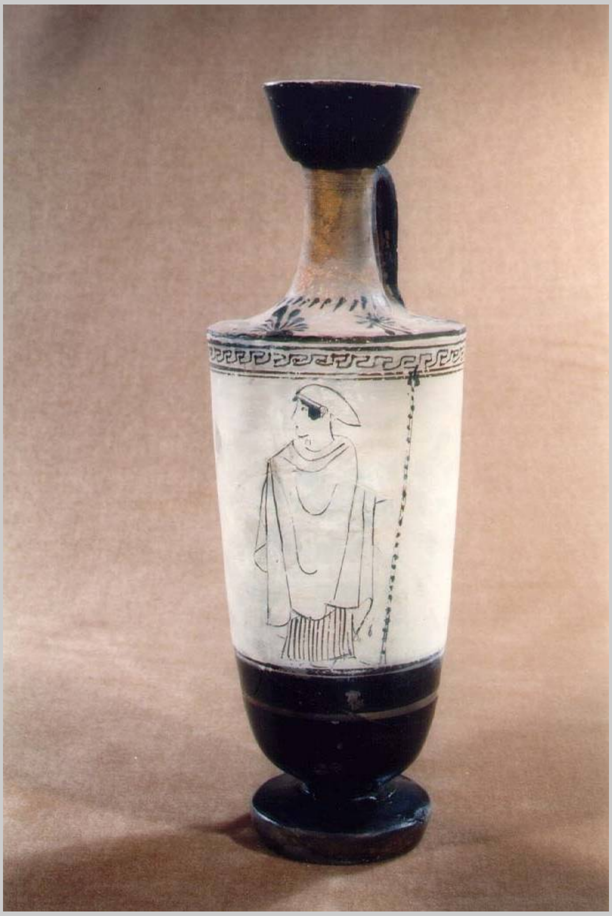
Terracotta Owl Cup. Both handles were missing and were shaped free-hand using a gesso-plaster. This was followed by colour-matching with acrylic paint. The additions are completely reversible and the surface texture is minimally different to avoid confusion in regards to the authenticity of the additions.





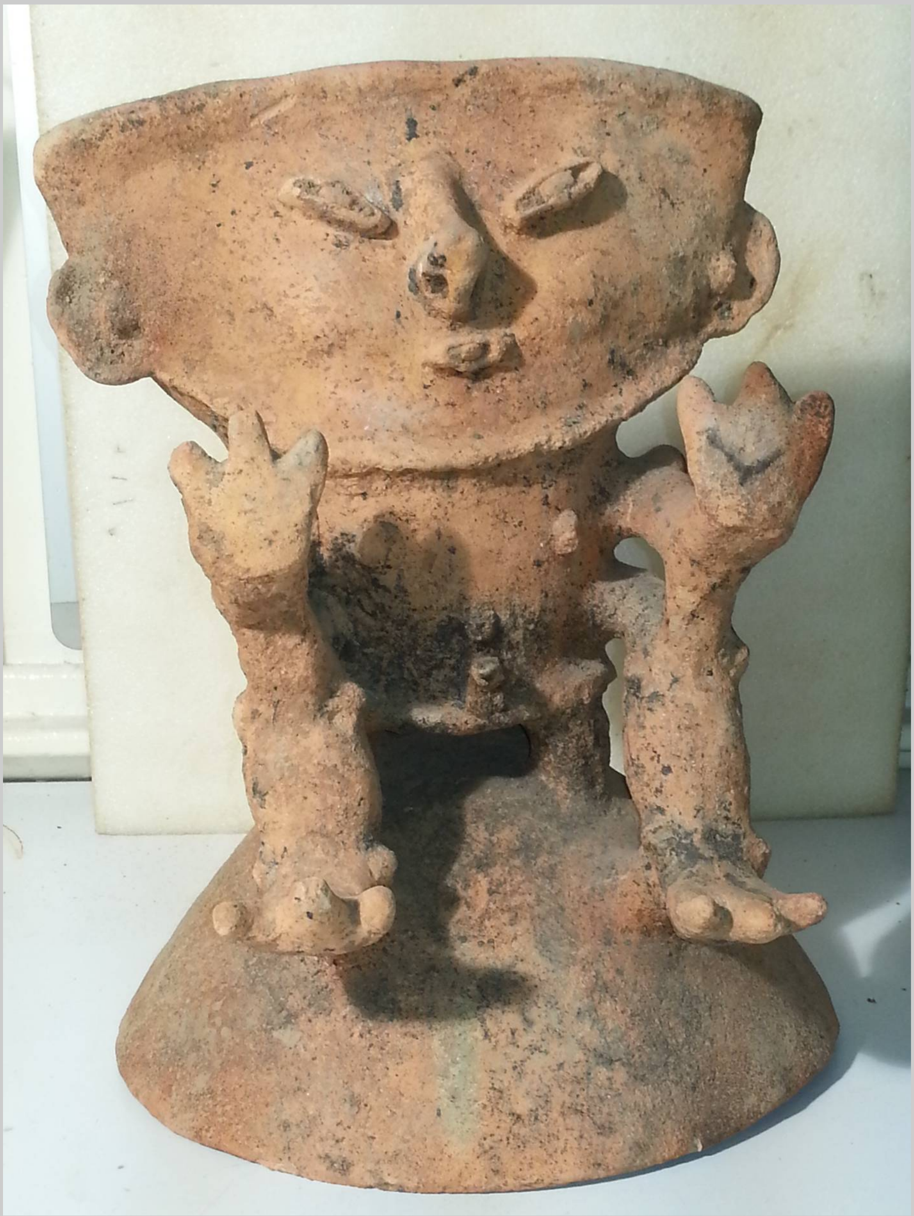
Mycenaean painted pottery pyxis, With double handles and decorated with a wavy line around the shoulder and concentric bands around the body and on the base, 7.9 cm. 1350-1300 BCE, height: 7.9 cm. During the conservation treatment calcareous deposits were removed with a scalpel and a complexing agent. This was followed by in-painting parts of the missing decoration with acrylic paint to complete the visual integrity.



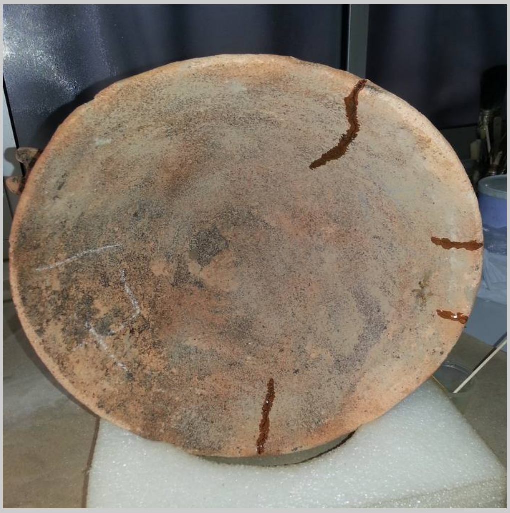



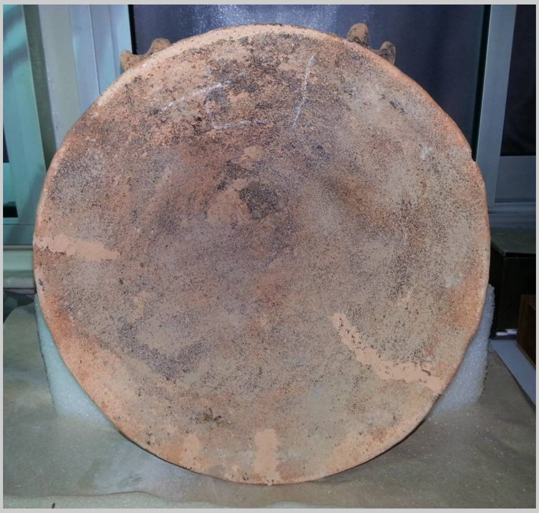
Attic white-ground lekythos, With a maenad holding a thrysos and wearing a chiton, himation, earring, & sakkos; black-figure palmettes on shoulder., Ca. 420-340 BCE, (21.9 cm).

The previous restoration had aged poorly The surface was covered with soot and grime. The fragments were disassembled and the old adhesive and dirt removed. The fragments were joined with acrylic and gap-filled and then retouched with acrylic colour. The treatment is reversible.

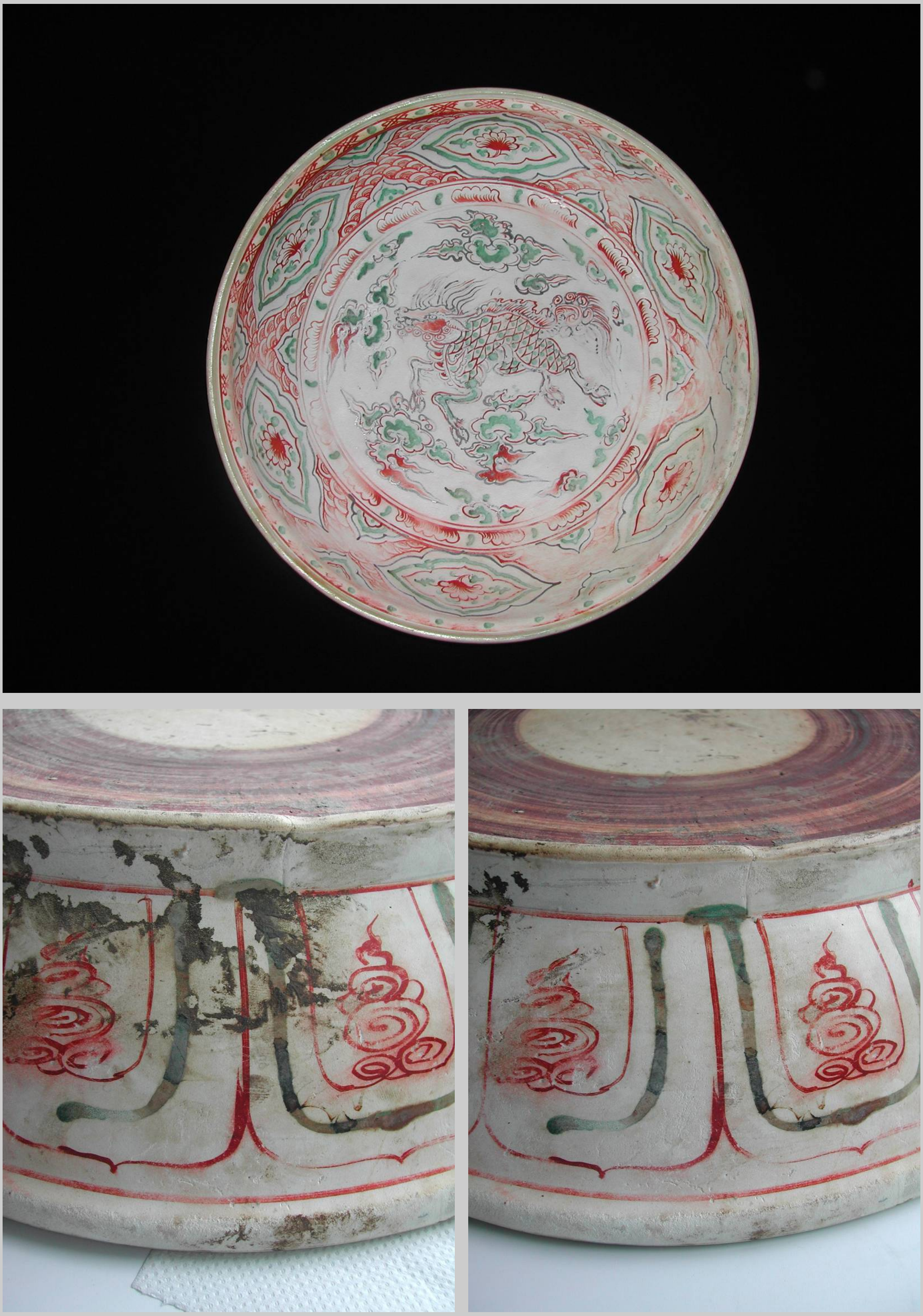


Anthropomorphic Aztec terracotta sculpture of a man seated on a stool (1345 -1521 century).

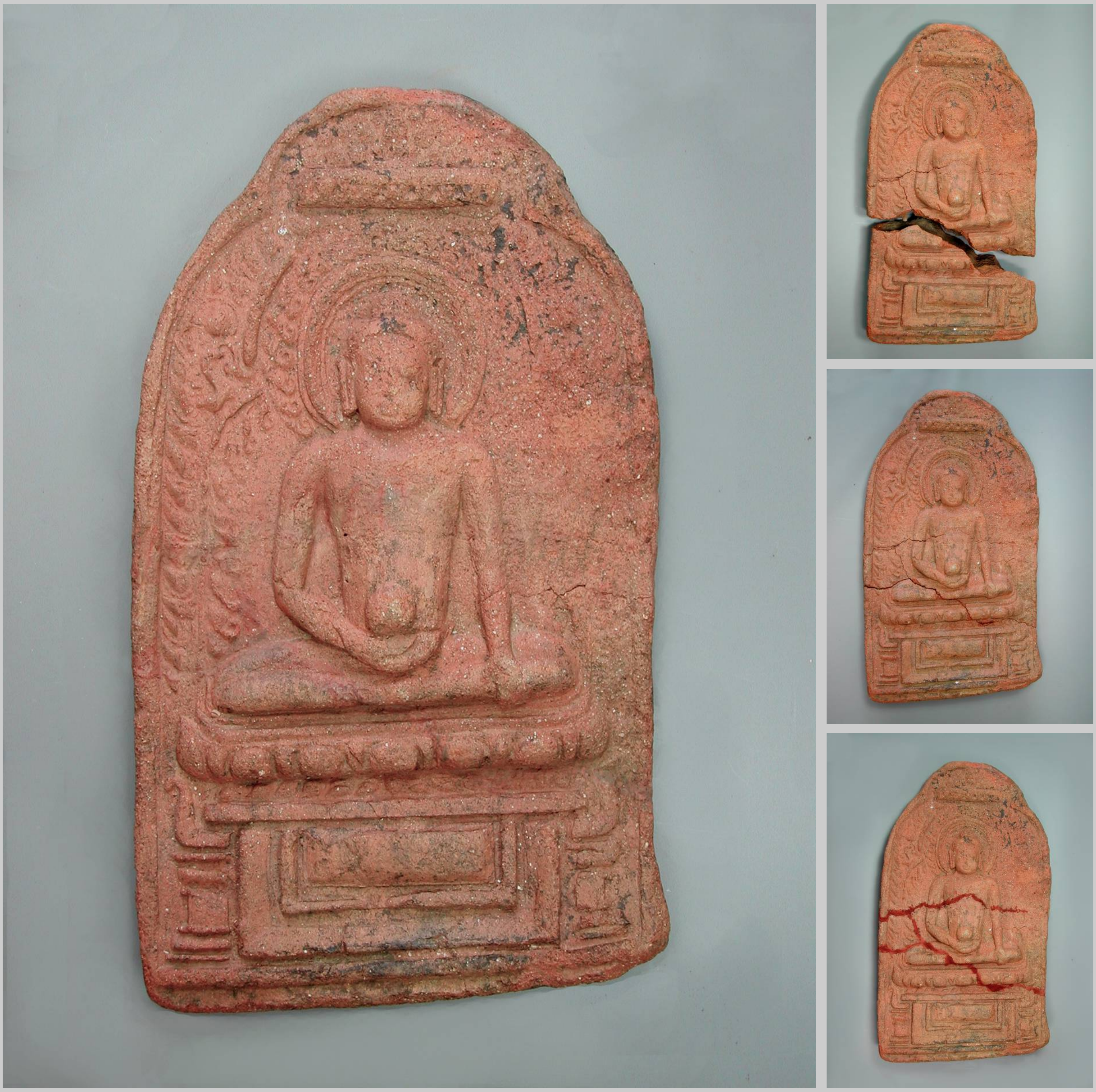




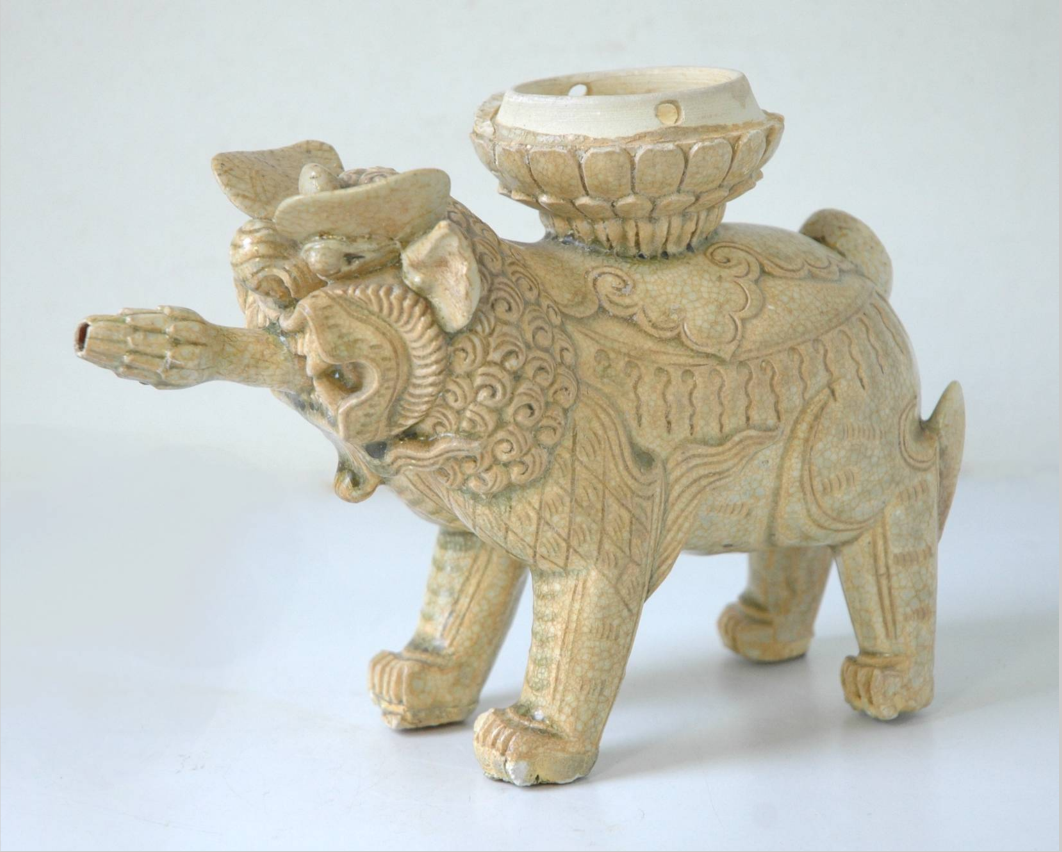
There were multiple large cracks in the round base. The cracks were joined with a synthetic resin, to prevent further damage. The cracks were then retouched with filler and colour matched with the surrounding surface. It will not be possible to remove the resin, however it was the safest way to treat the object in a tropical urban environment with temperatures around 30ºC this would help prevent further damage.

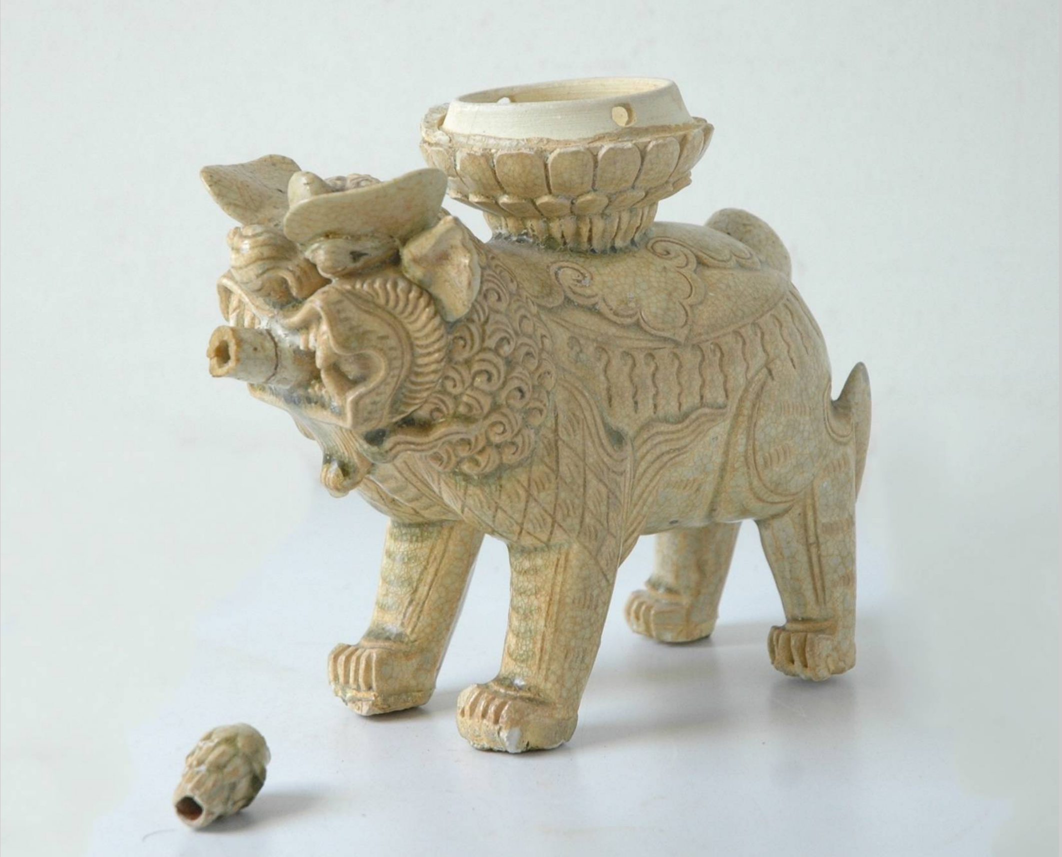


Large Vietnamese ceramic dish ~15th century CE, from a shipwreck. Probably from Chu Dau village in Hai Duong province. This village became popular at the end of the 14th century and became famous in the 15th and 16th century. The glaze had completely eroded and many of the pigments had also vanished. There was algae growth on various parts of the surface. The algae was removed with a solvent mixture and on the request of the owner, the surface coated with a solvent soluble synthetic coating, which is reversible and protects the very porous surface from airborne oils, soot and dust.

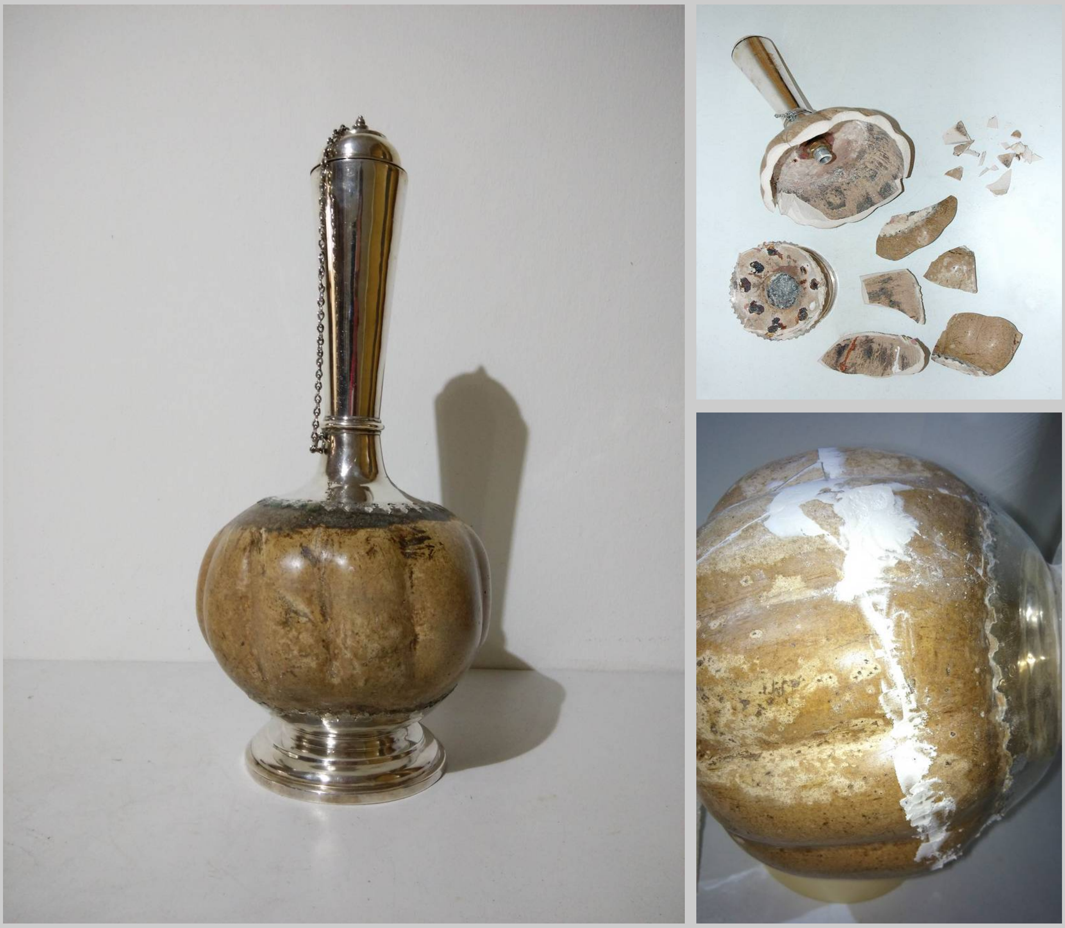


Terracotta Pyu Myanmar. The tablet was broken in half and had various severe cracks that needed treatment. The cracks were consolidated with a synthetic resin. The same resin was used to join the two fragments. No dowel was needed since the fractured surface was topographically suitable for a less invasive procedure. The remaining voids were filled with a calcium based synthetic filler and colour-matched using acrylic colours.

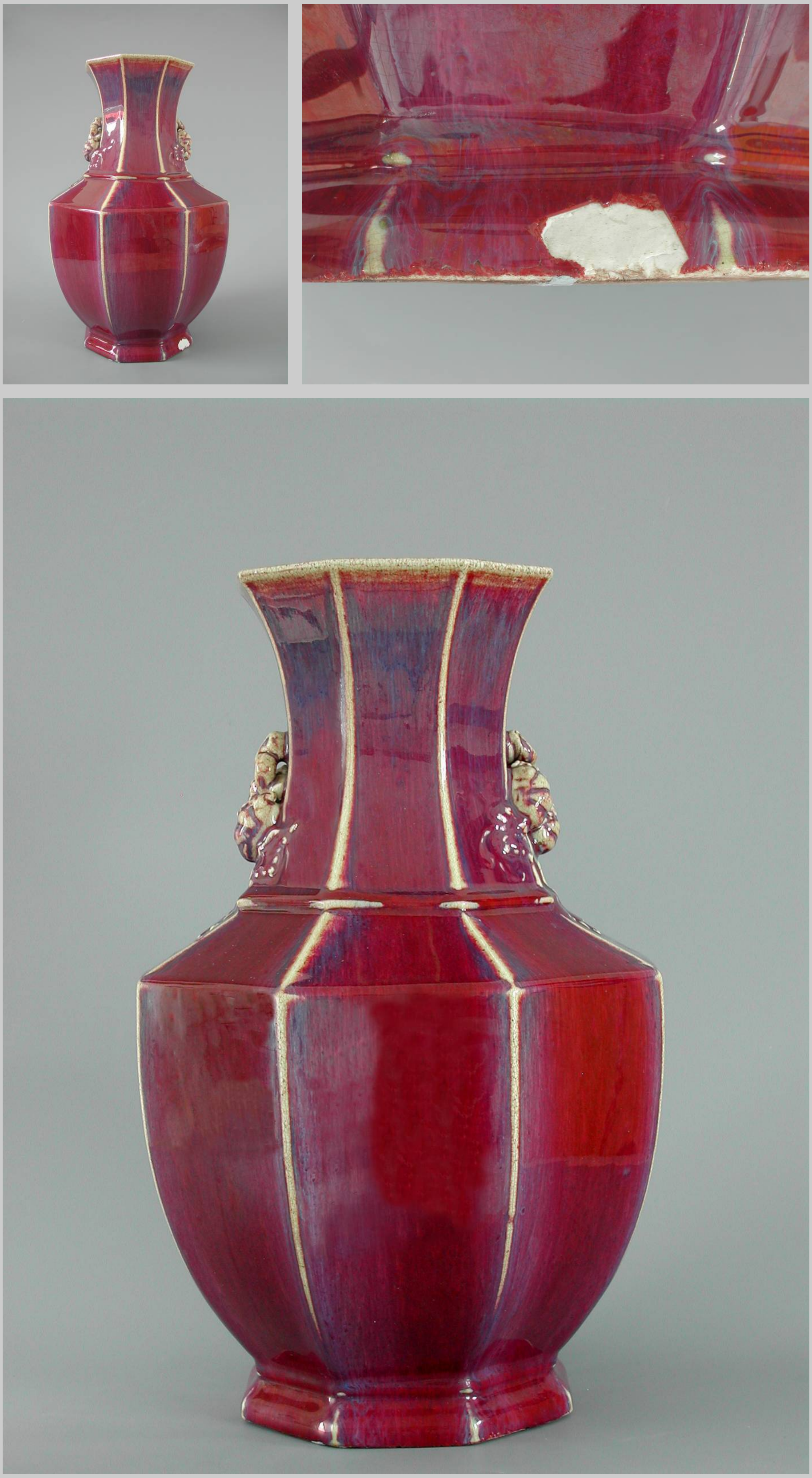




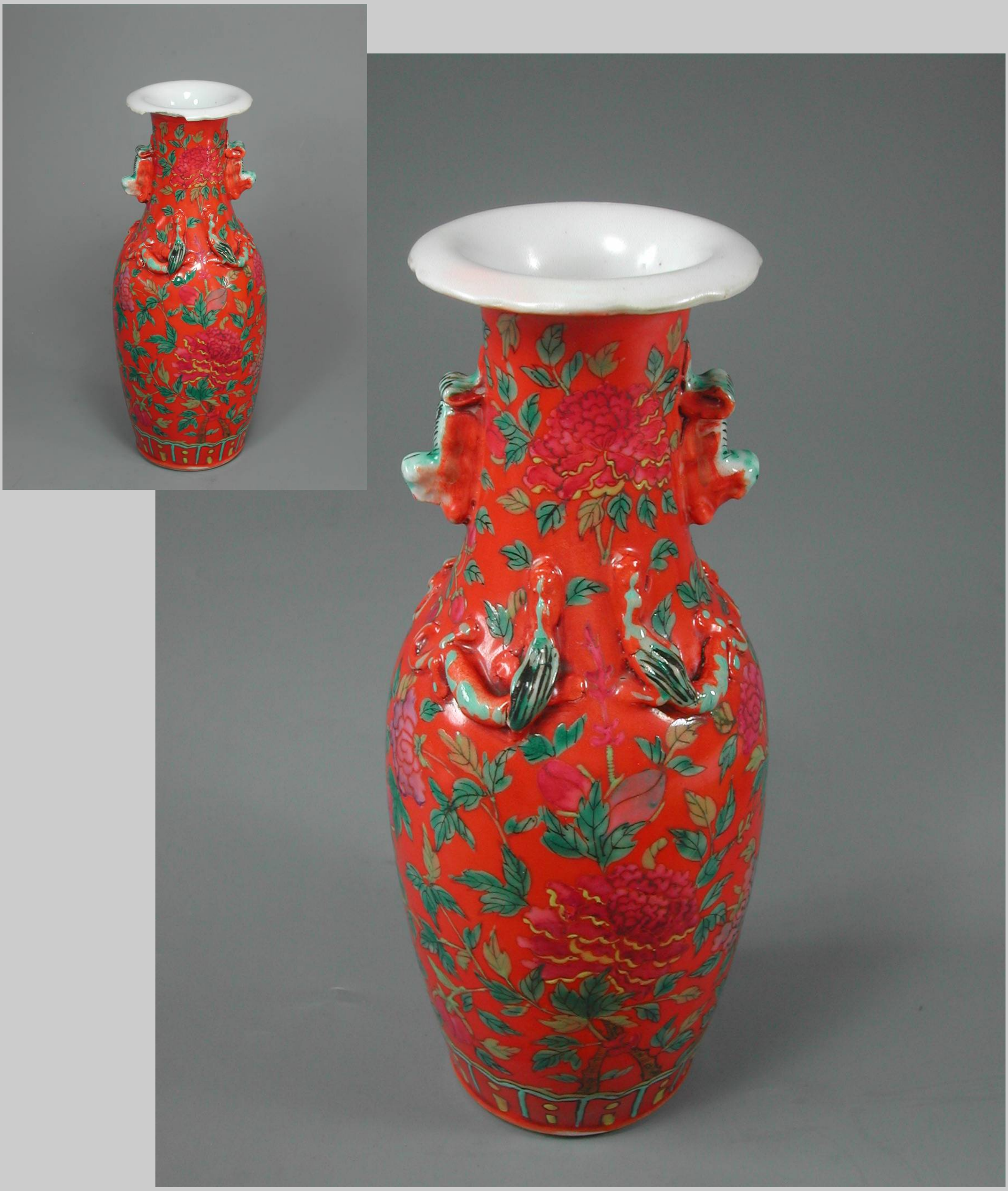
Vietnamese antique terracotta elephant. The trunk had 2 fractures, a new break and old restoration damage. The old restoration was undone and the trunk assembled using a synthetic resin. The gaps were filled and retouched using mineral pigments containing synthetic lacquer



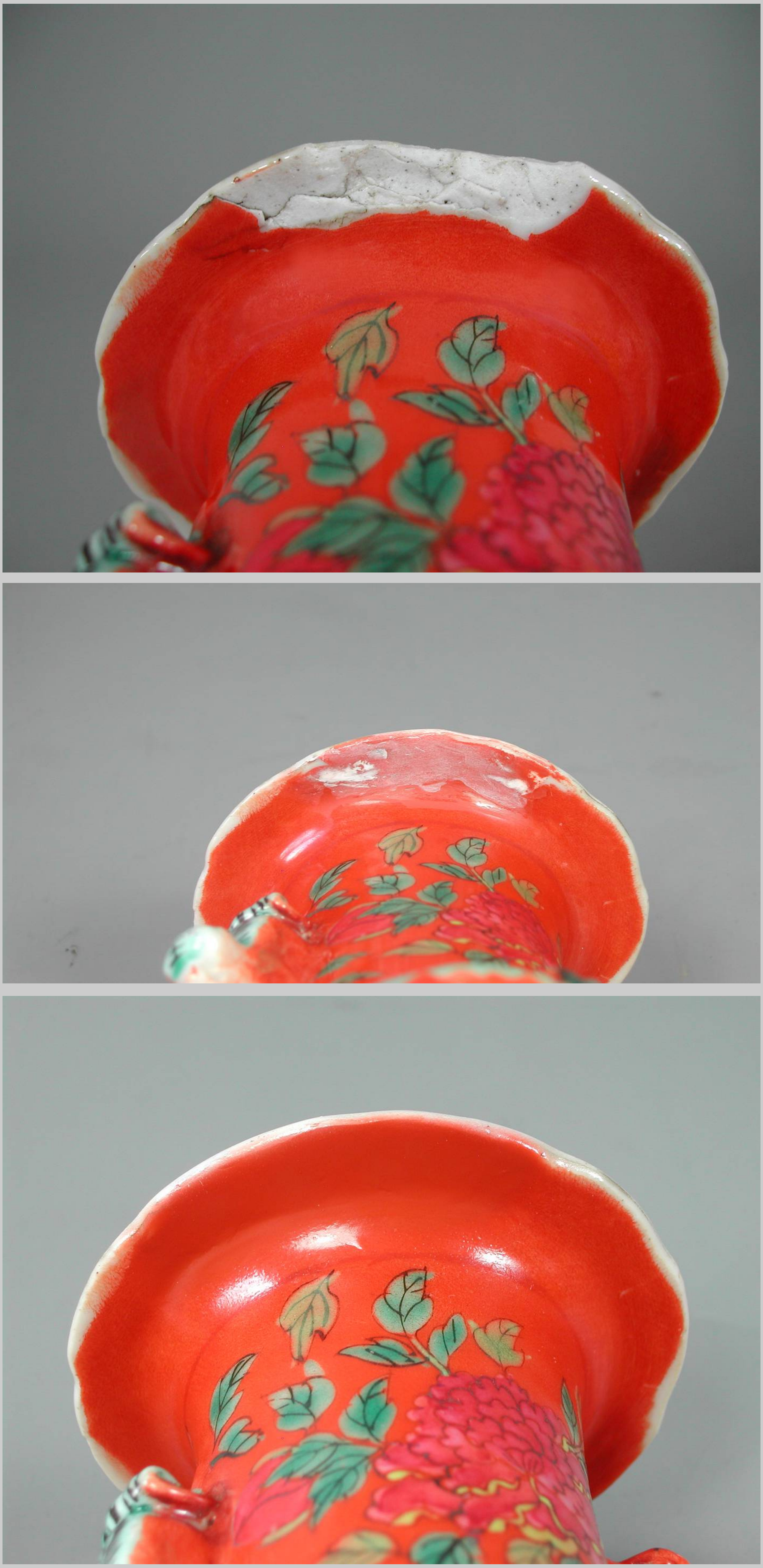
Surahi, ceramic with silver spout. The fractured body was cleaned, joined with a synthetic adhesive and gap-filled with a synthetic filler containing calcium carbonate. The fills were colour matched and coated with a clear lacquer The process is completely reversible.



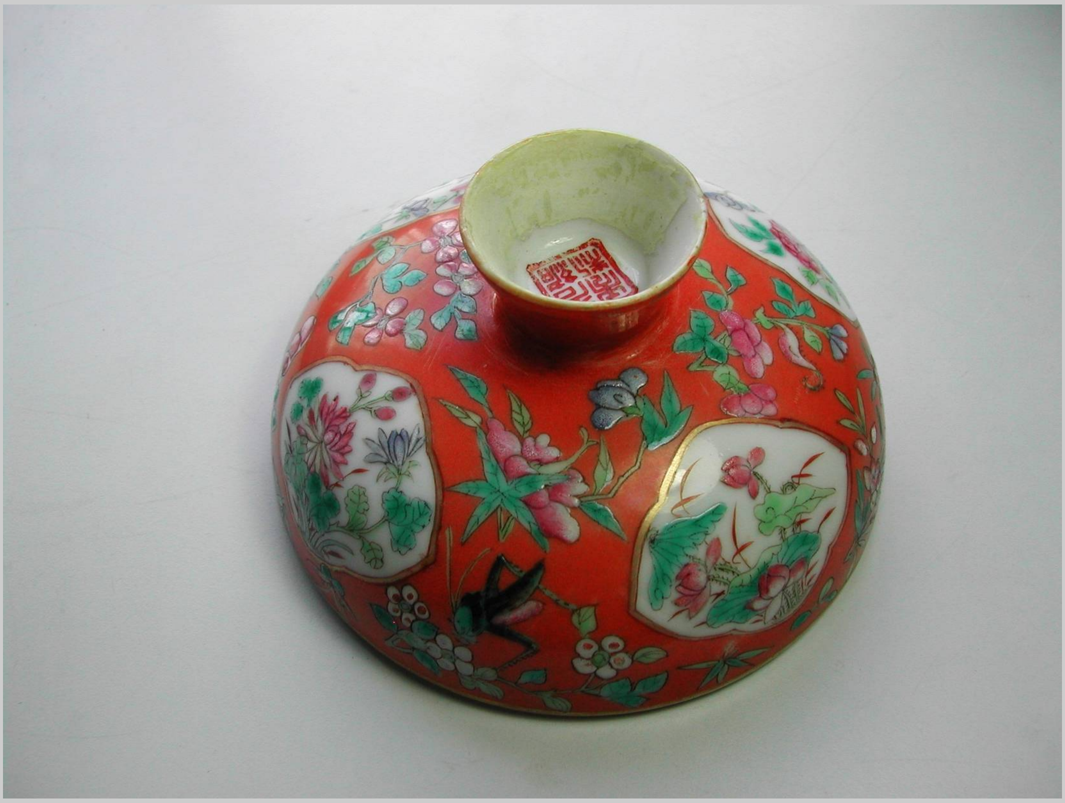
Aubergine coloured Qing Dynasty porcelain vase (1644 to 1912). A chip was missing on the base of the foot. It was replaced with a filler and coloured with synthetic paint and lacquered with a clear lacquer

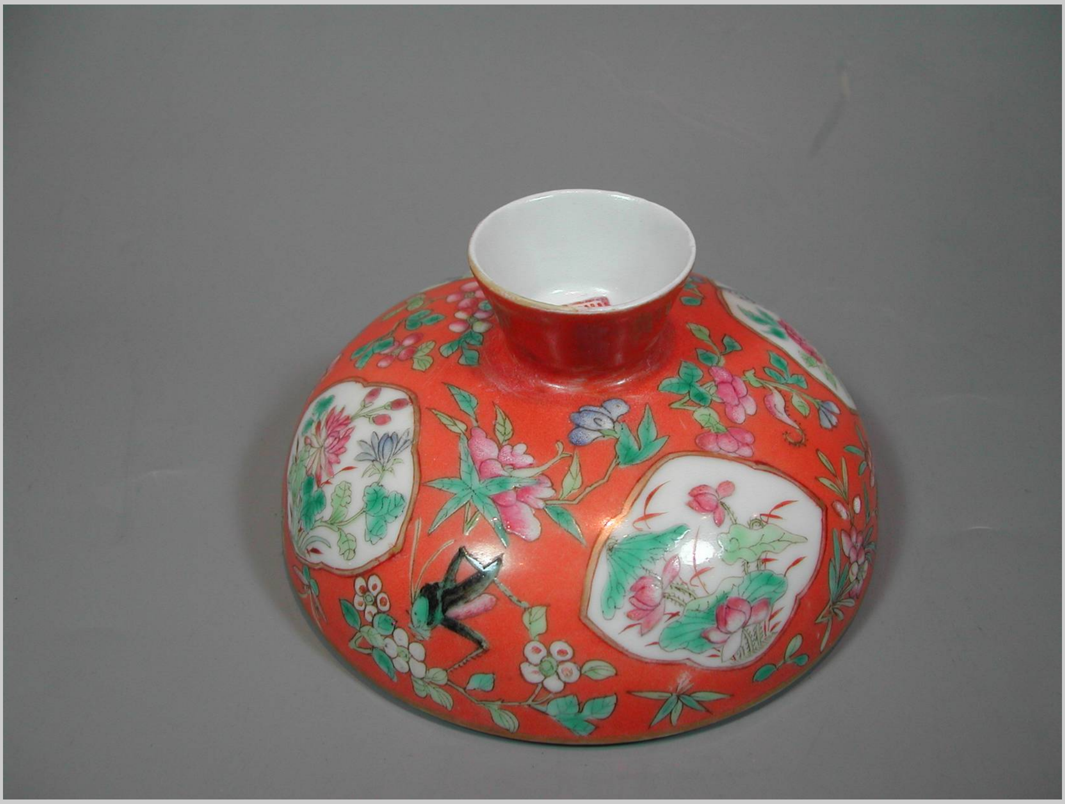


Coral coloured Peranakan vase. The lip of the vase was chipped and needed treatment. The damage was cleaned, gap-filled and colour-matched. A clear coat was added to protect the restoration.

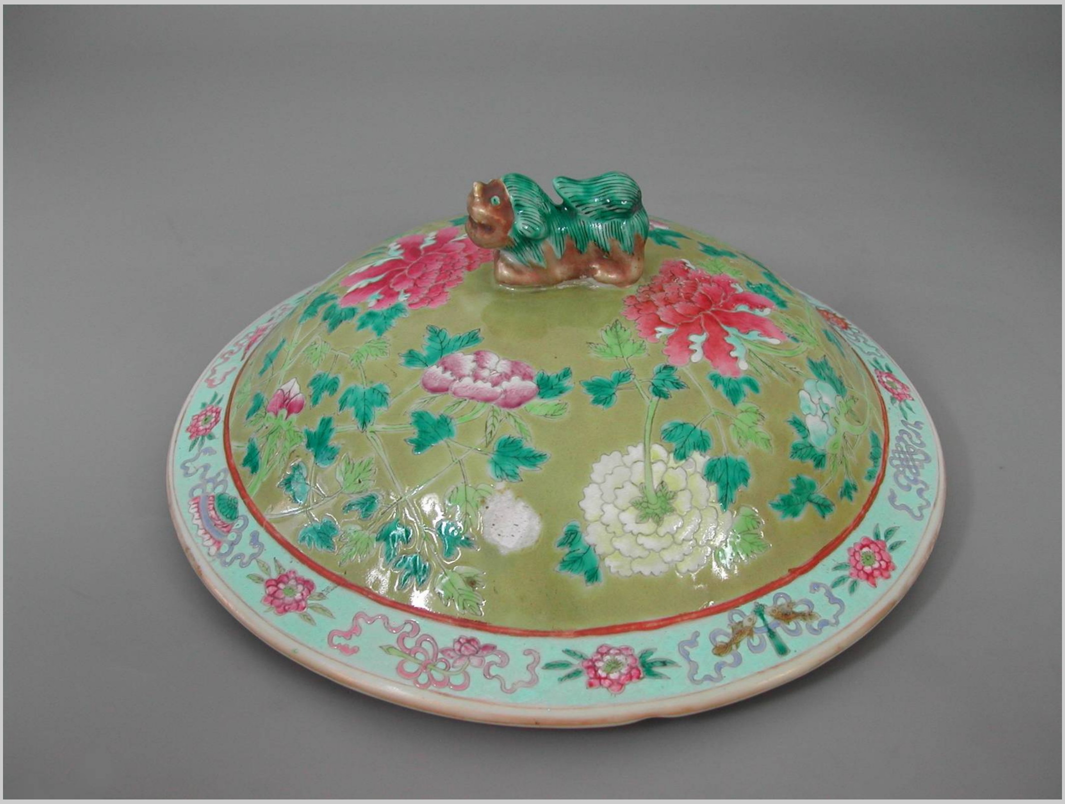


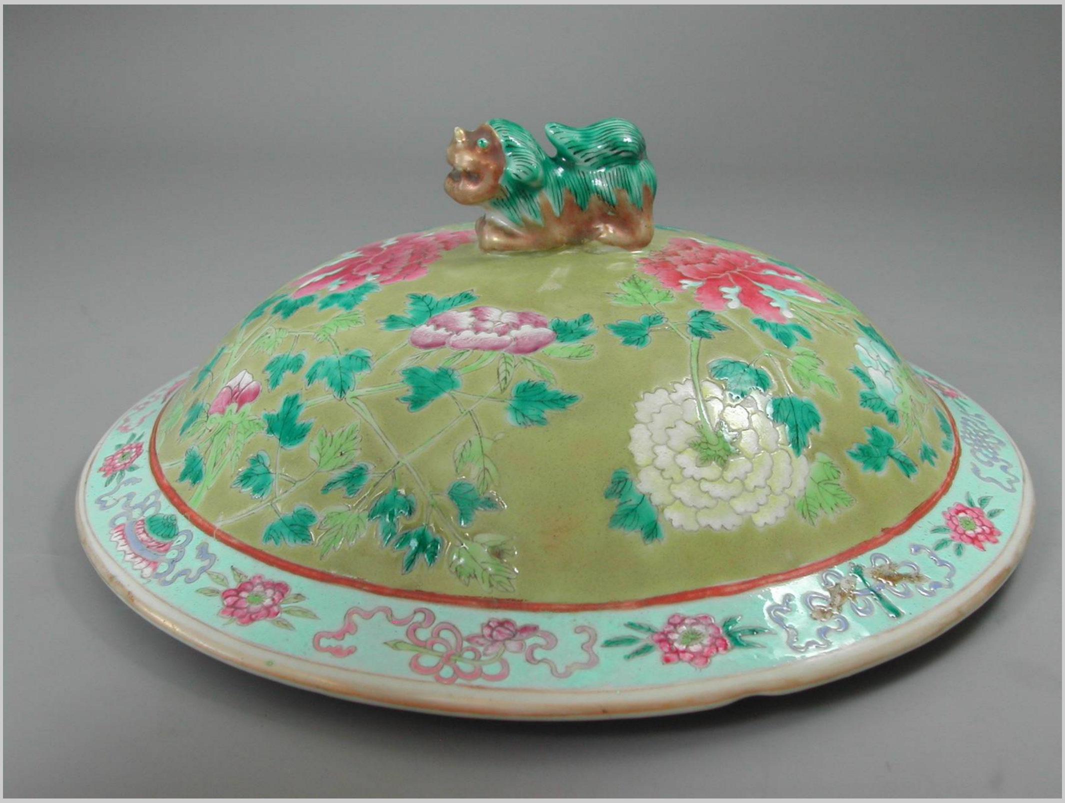
Lip of Peranakan vase, before during and after treatment.



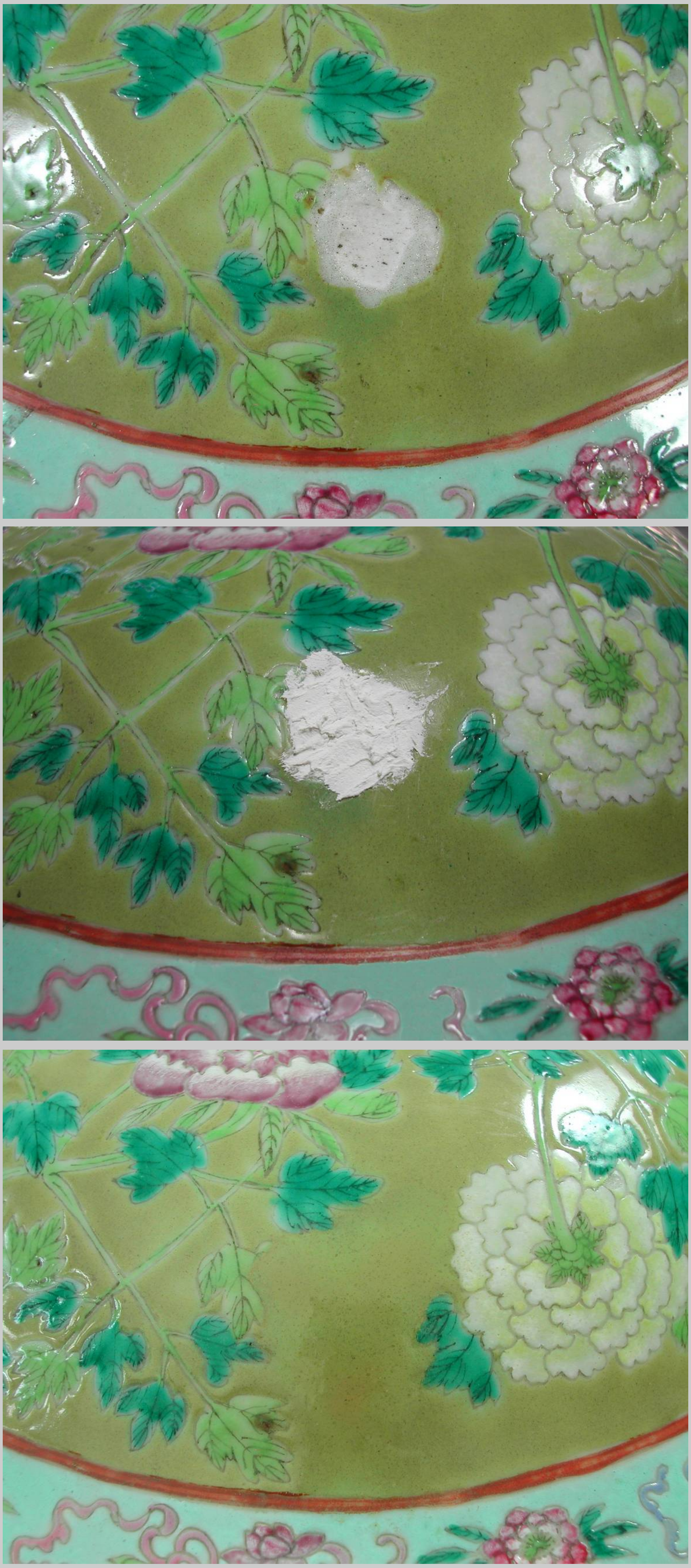


Peranakan, Nonya Chupu lid with a damaged finial it contained an old restoration. The fill was cleaned, gap filled and colour-matched and covered with a clear coat.

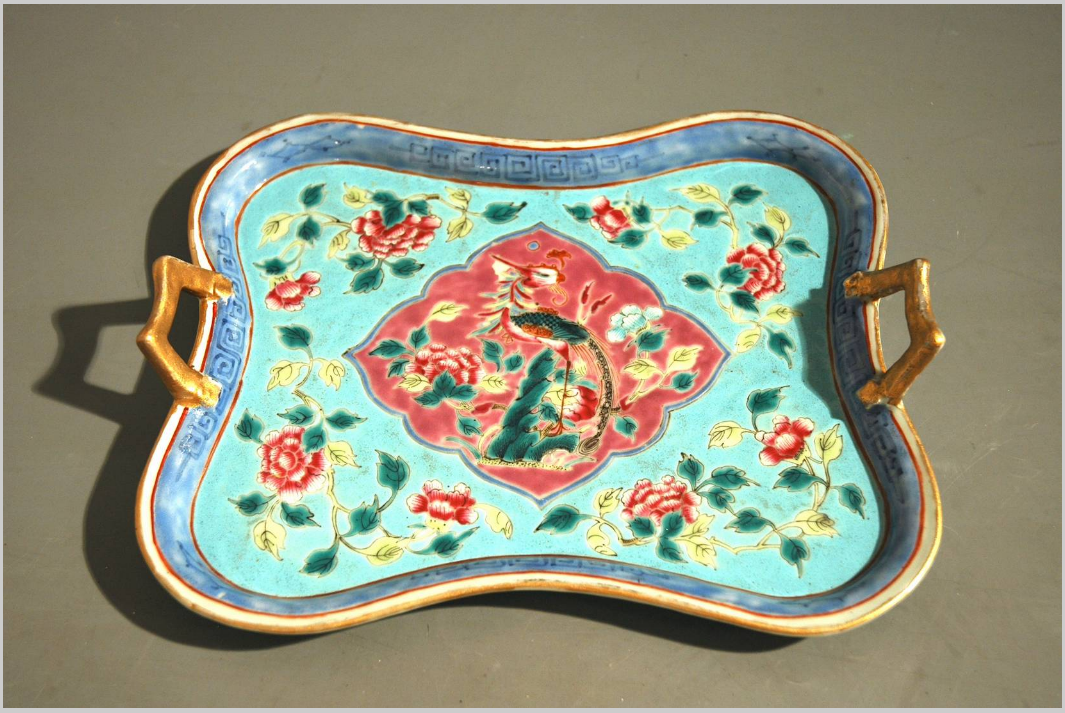


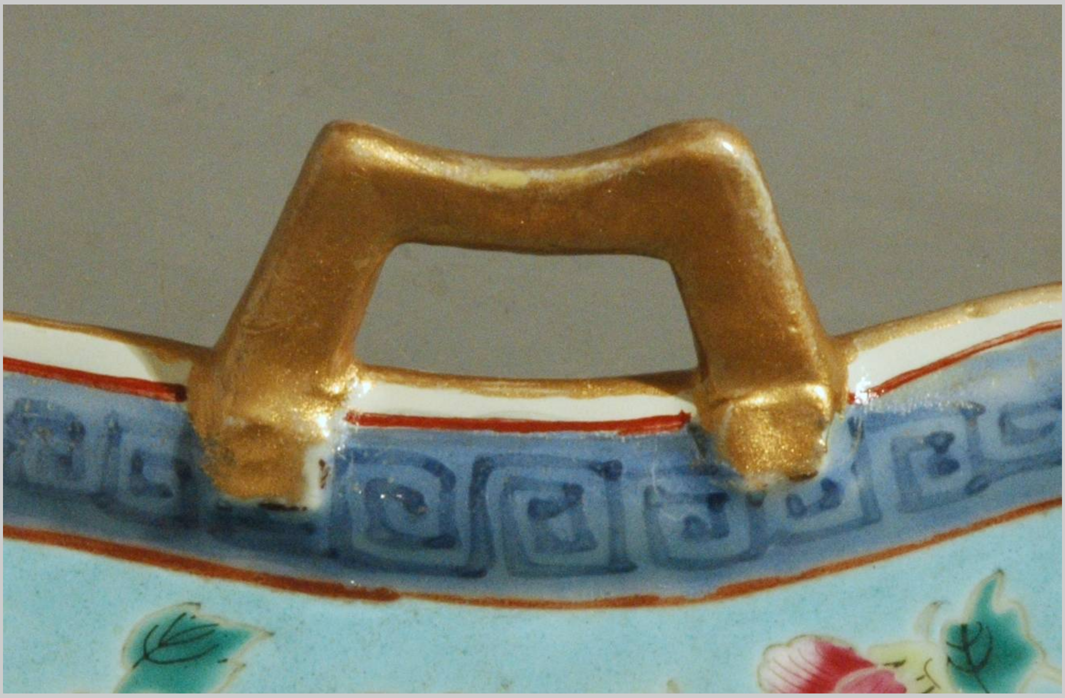


Peranakan cover of a jar (Camcheng). The lid had an unsightly chip missing. The missing area was gap-filled, colour matched and covered with a clear coat for protection.

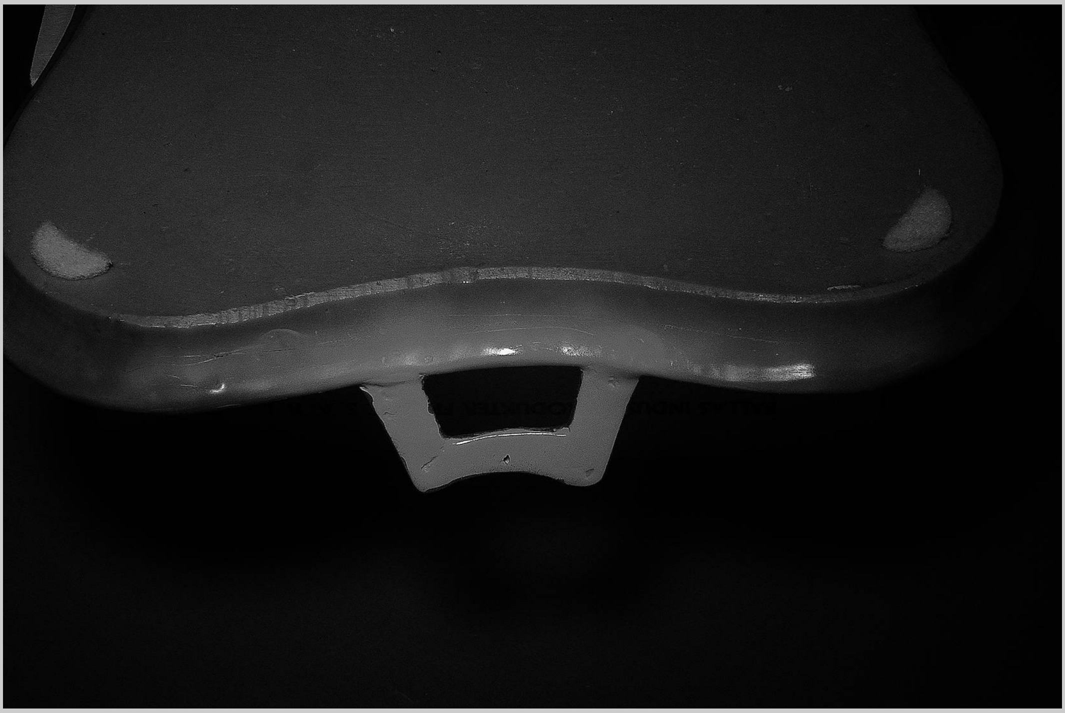


The missing area before, during and after restoration-conservation. The missing section of the light green leaf was not reinterpreted to prevent misinterpretation of the integrity of the surface.

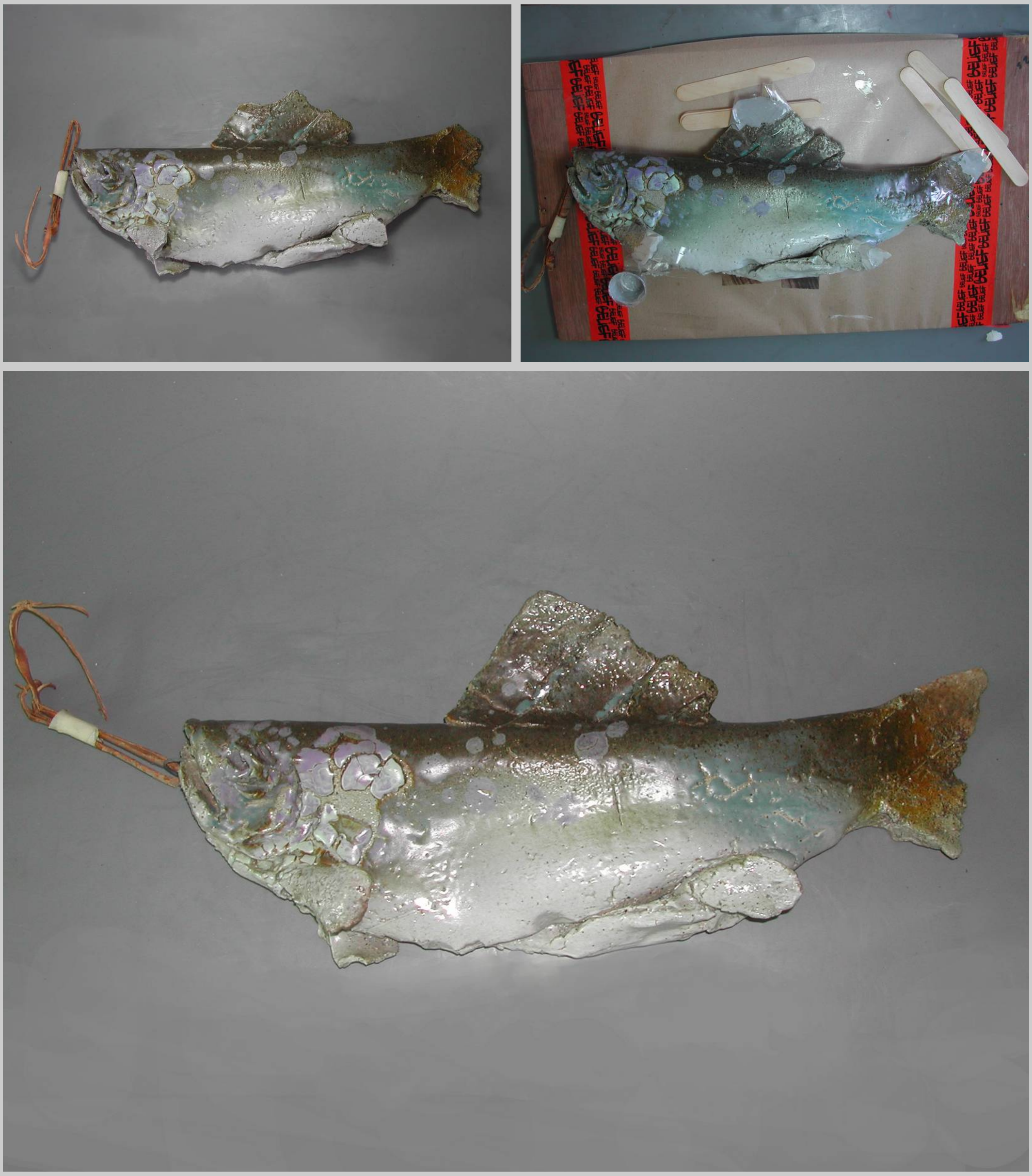




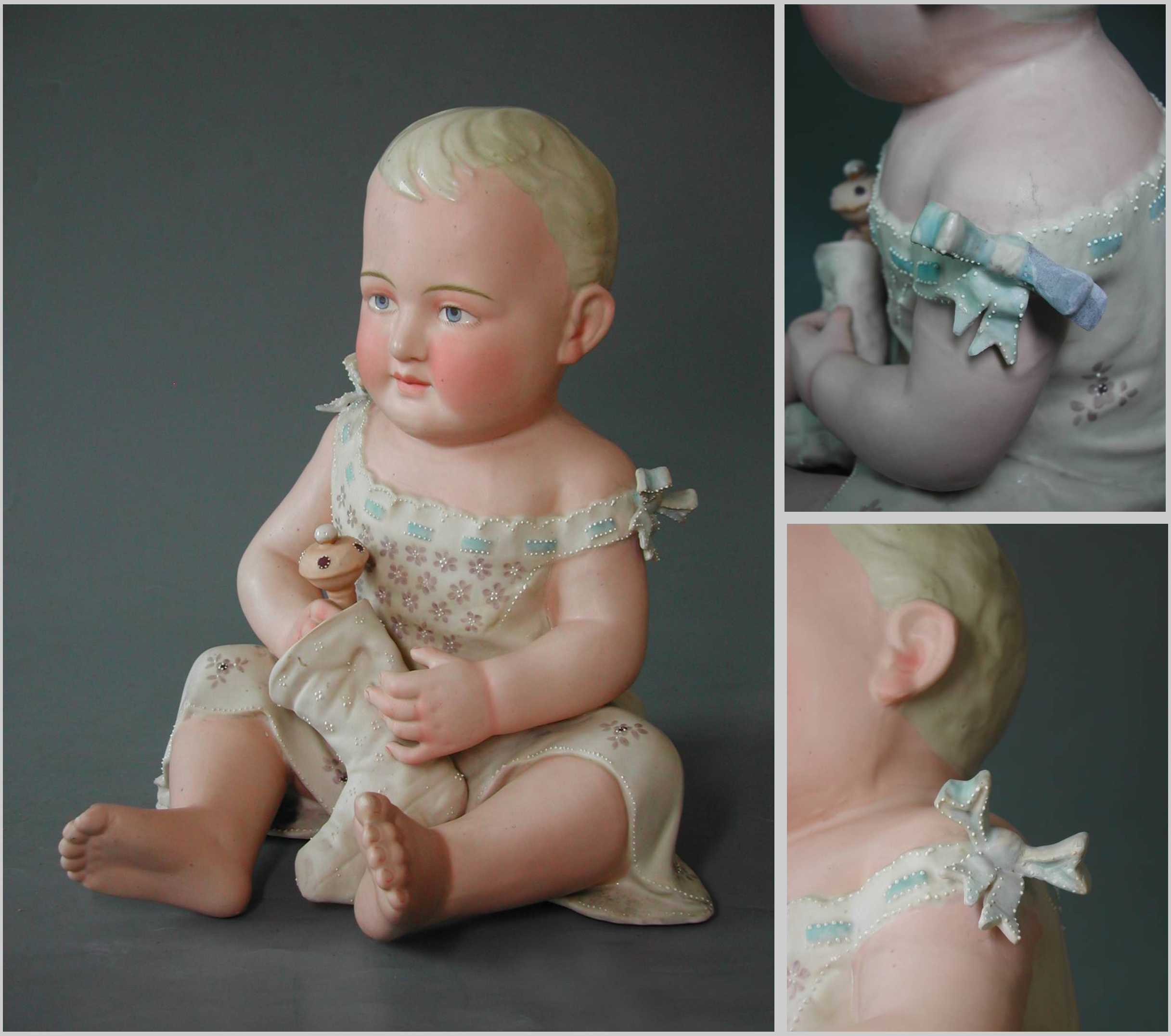
Antique Peranakan porcelain tray, end of the 19th, beginning of the 20th century. The owner was concerned with the authenticity of the proper right handle. The gilding did not appear as I expected it to and the wear and tear was unnatural. I did not carry out any solvent spot testing to prevent damage to the old restoration. So infrared imaging was used to determine if there was overpainting and to what extent.



The infrared image indicated the visible light and its temperature reflected by various materials.  In this case we tried to determine the original mineral based material and hydrocarbon lacquer based paint. In the above image the first thing to notice is that the surface structure is different and varies greatly in its topography, the original vitreous glaze is much more reflective. The airbrushed areas are much duller. The airbrushed sections are much lighter and in parts circular light areas can be seen where the paint flow and thickness is much denser than the lighter more radiating new paint areas. The wear and tear of the surface is non existent and some of the edges of the handle are much sharper. The recesses are not filled with detritus and are evenly painted. This handle has been clearly restored recently. Such a restoration undetected could be fraudulent and artificially increases the value of the artefact.

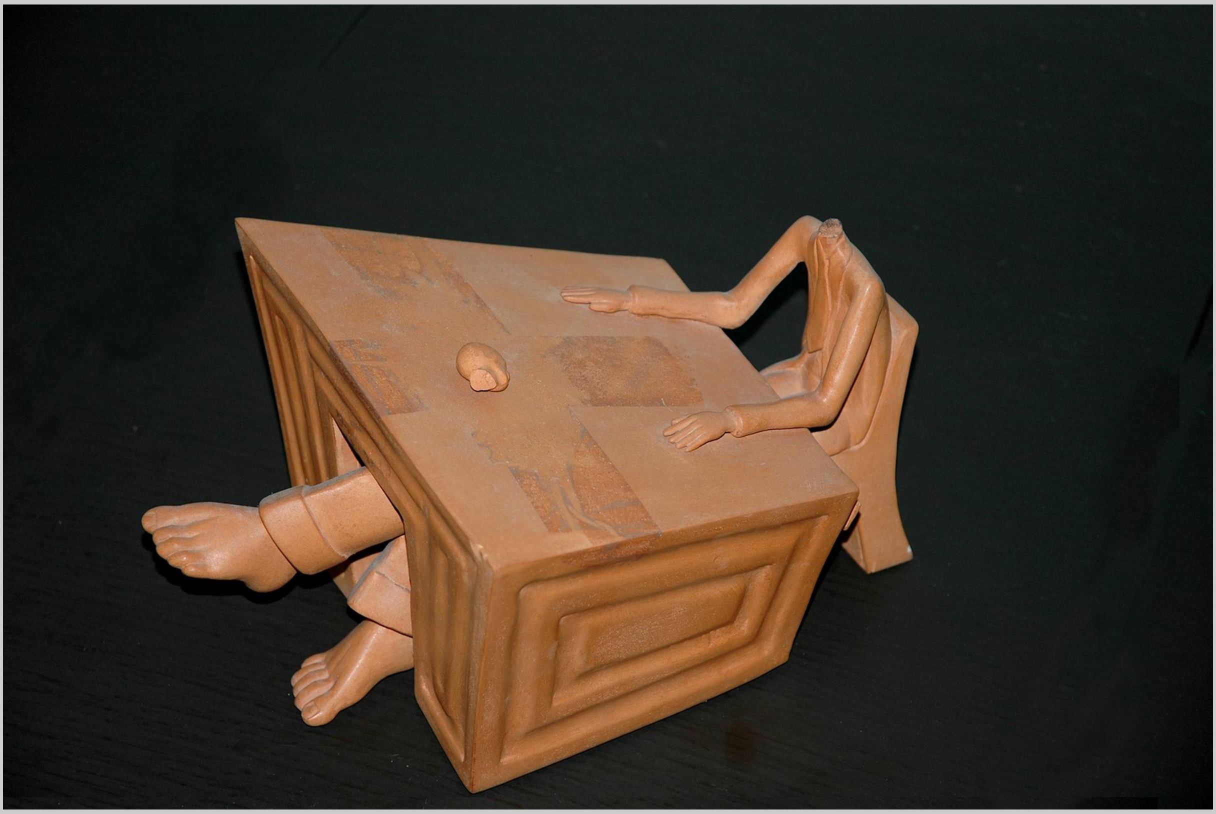


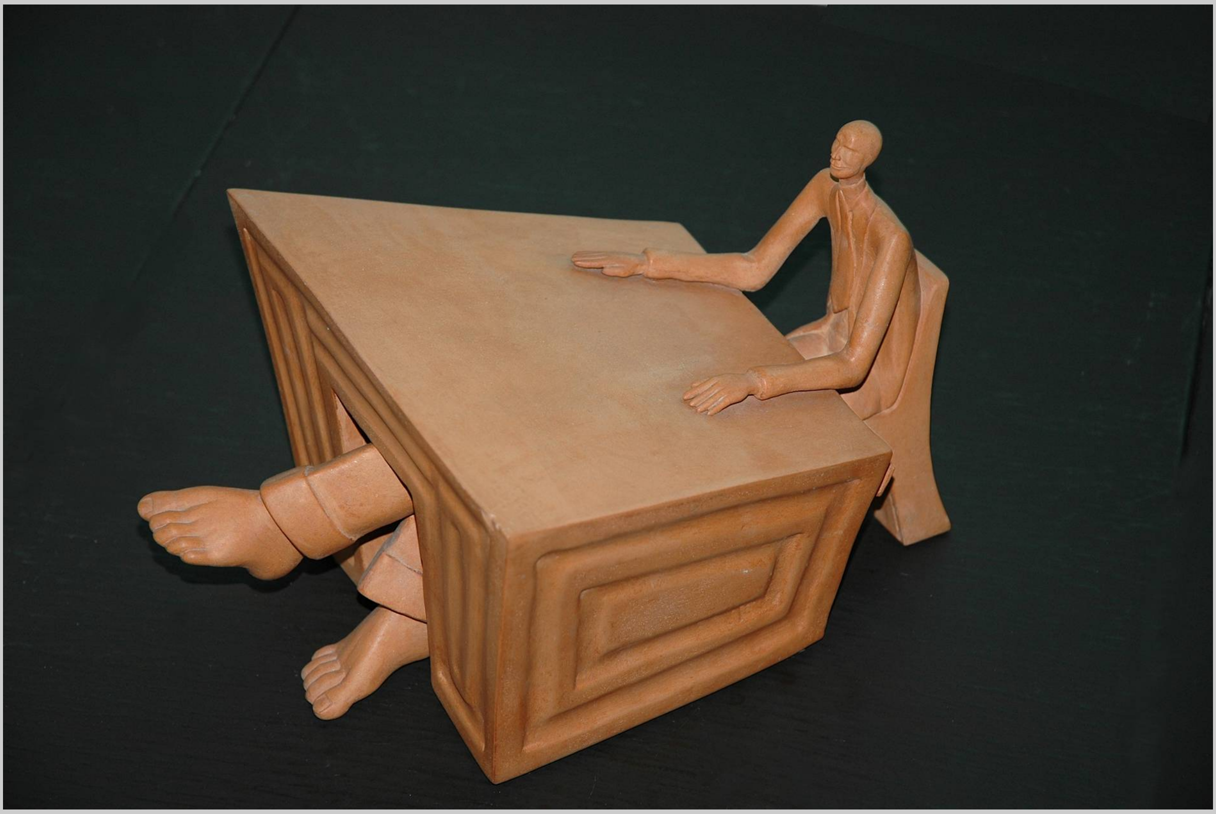
Contemporary Ceramic Fish. Dorsal, tail, ventral and anal fin had been heavily chipped and the pieces were missing. The parts were reconstructed in grey two component polymer. The hardened polymer was shaped and coloured with an acrylic paint. A gloss lacquer was added to protect the reconstructed areas.



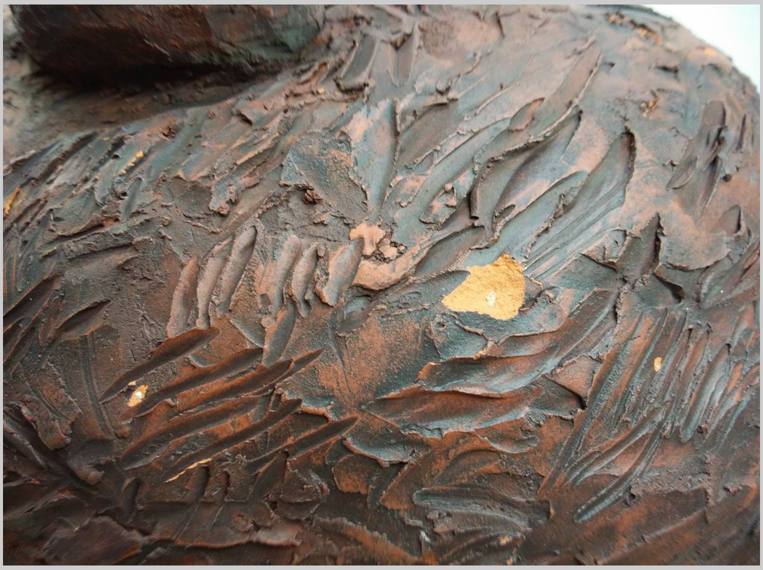
Antique bisque or porcelain baby doll (1860 -1900 European).

One part of the bow on the proper left shoulder was missing. The bow was reshaped in a two component resin with filler. It was coloured with acrylic colour and lacquered with a clear acrylic lacquer



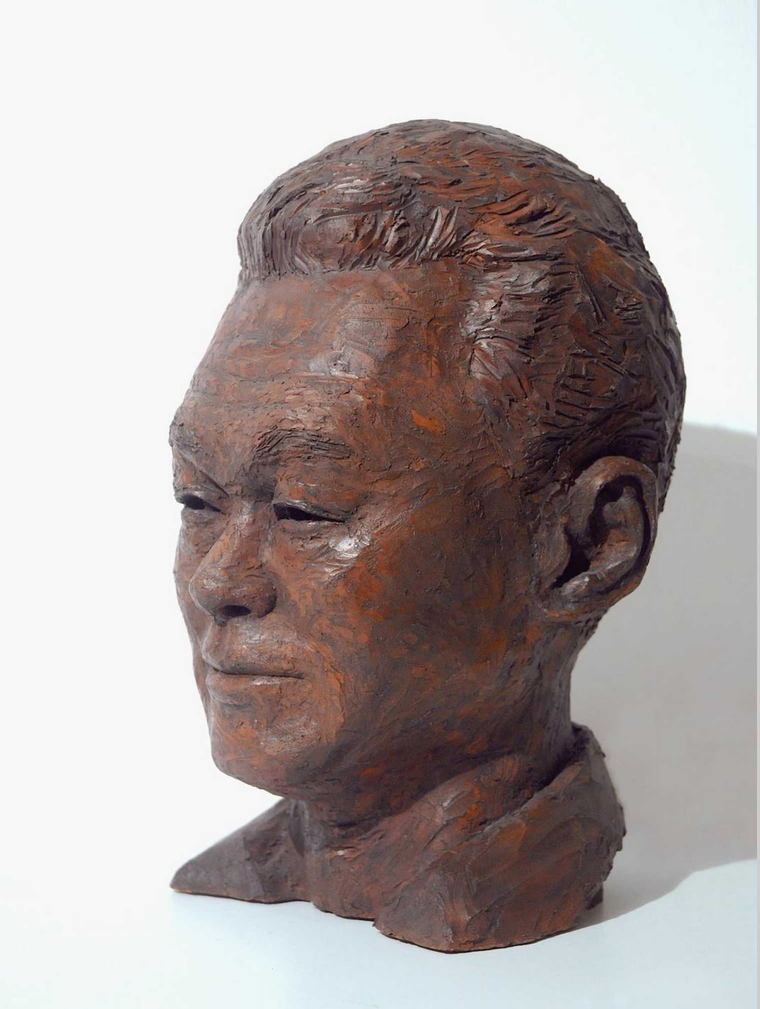


Contemporary terracotta sculpture. The head was fractured at the neck and taped to the desk with adhesive tape. There were markings from the tape and old adhesive on the fracture. The adhesive and the discolouration on the desk were removed with solvent. The head was doweled to the neck, gap-filled and colour-matched

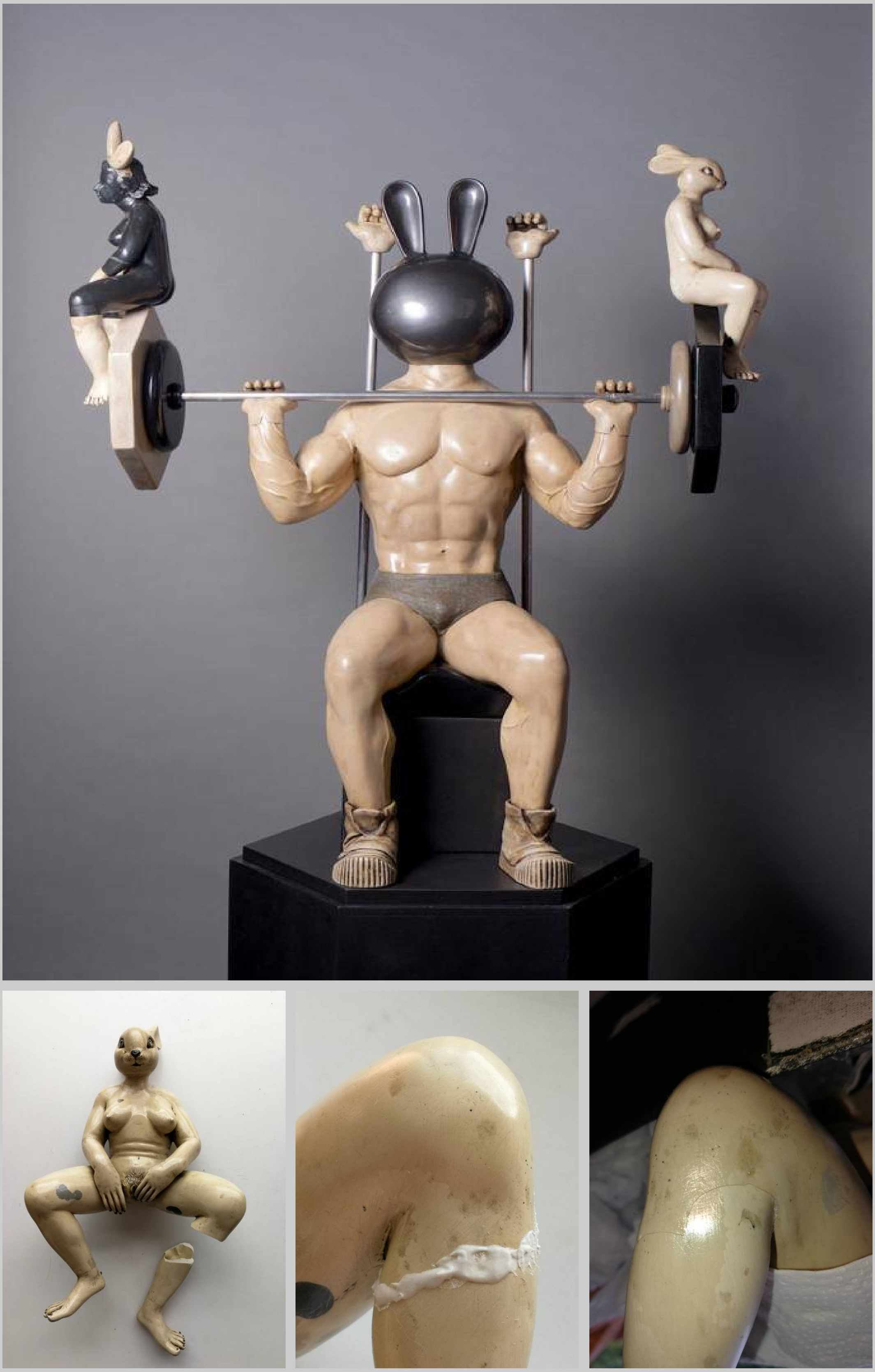


Lee Kuan Yew terracotta bust.

The surface had various small chips missing due to what appeared to be salt inclusions in the original wet clay, probably introduced during the forming. They are in the centre of the missing flakes (white spots). The damage is due to hydration and recrystallisation of soluble salts contained within the fired clay and the growth of bigger crystals and therefore more pressure build up.

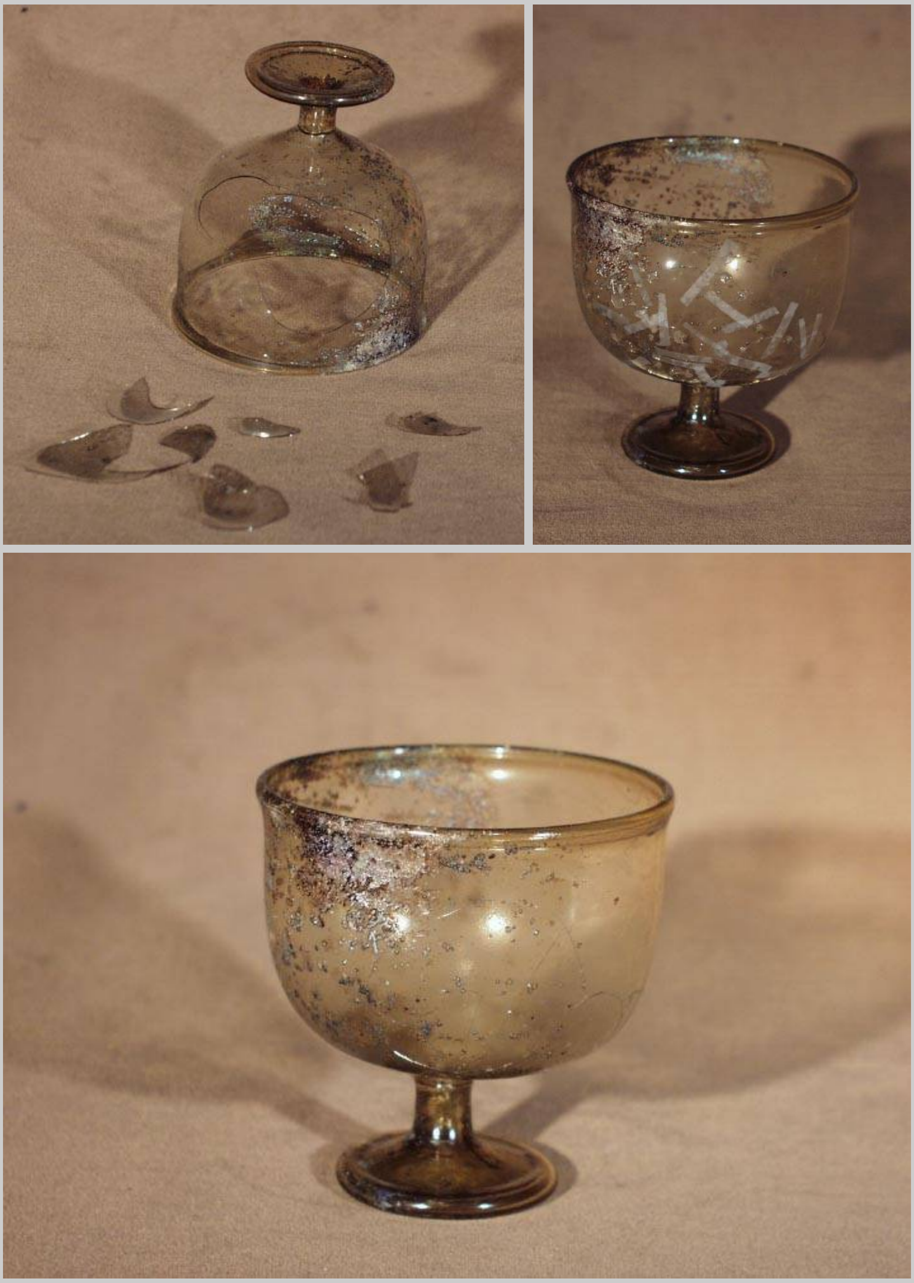


The bust was solvent cleaned and the larger white salt crystals manually removed. The missing areas were gap-filled with a calcareous filler and colour matched with the surrounding surface using acrylic colours. The additions are completely reversible.

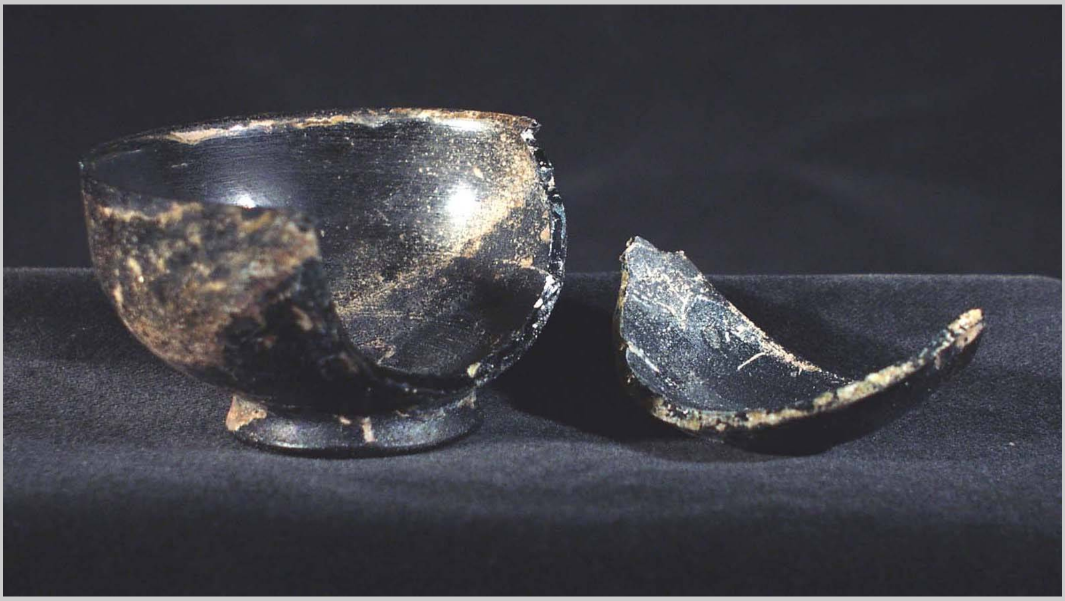


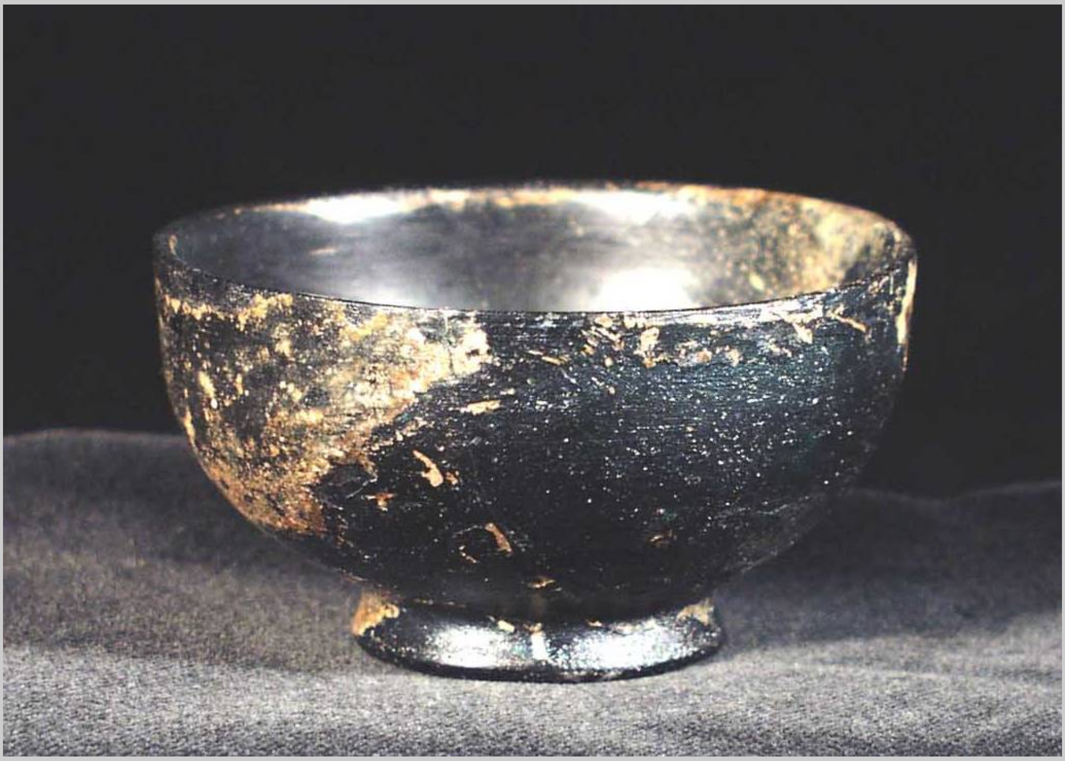
Restoration Ronald Ventura “Weights”The proper left leg was fractured. The leg was joined with a dowel and a synthetic adhesive. Gap-filling was done with an aluminium silicate and the colour-matching with a conservation grade paint.

# Glass



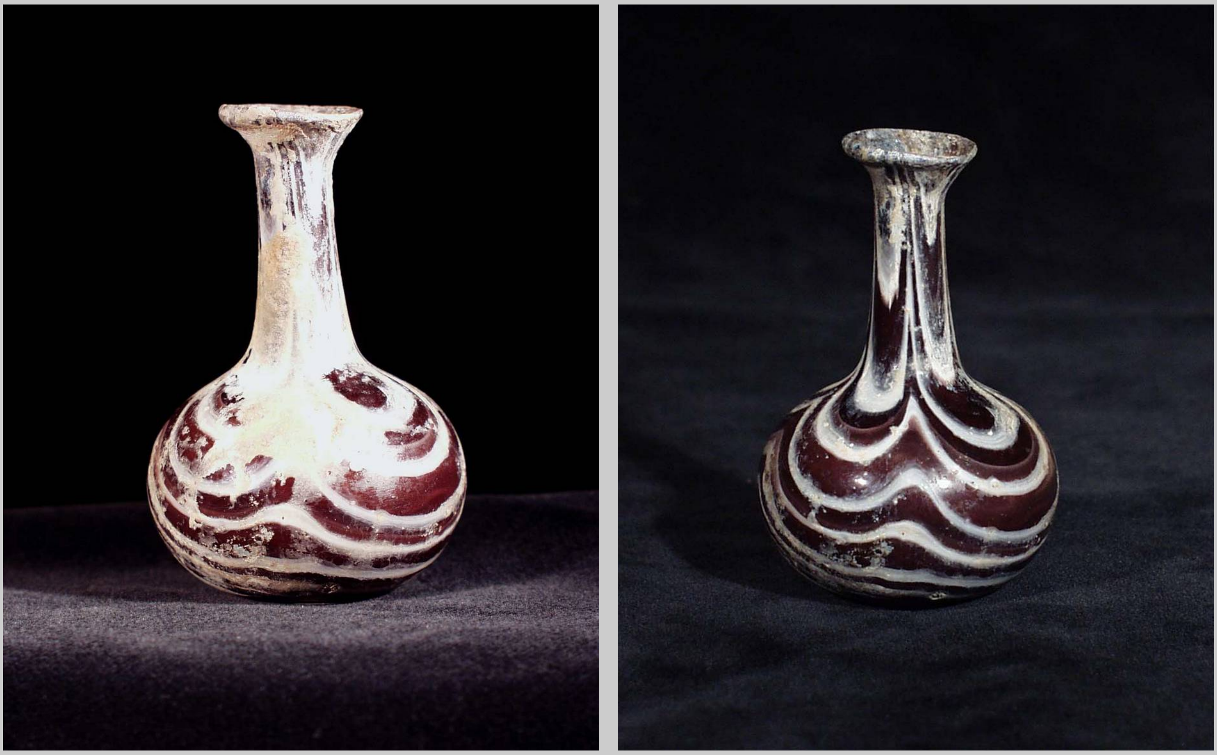
This antique Roman glass “Cuphas” had an impact-fracture that showed that it was a recent damage, all the fragments were present and the edges were very sharply defined. The fragments were taped into place using masking tape. Small strips allowed the pieces to be placed and adjusted without damaging the surface. The fluidity and refractive index of the resin applied, allowed all the cracks in the glass to be filled and effectively disappear.



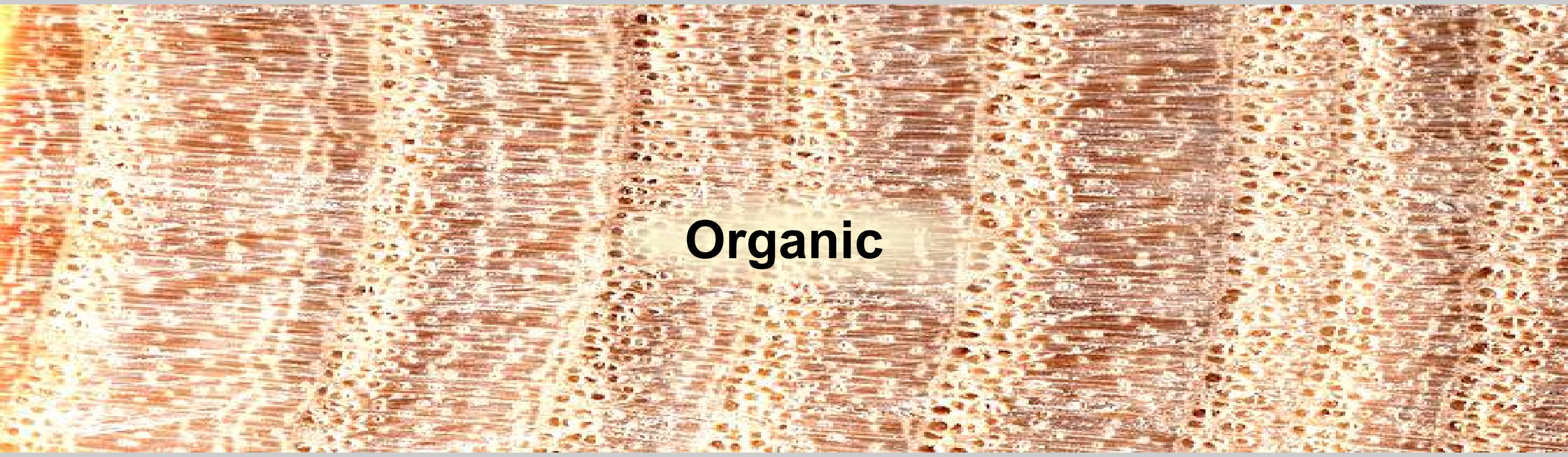


A dark green, ancient Roman glass dish, was accidentally damaged during transportation.

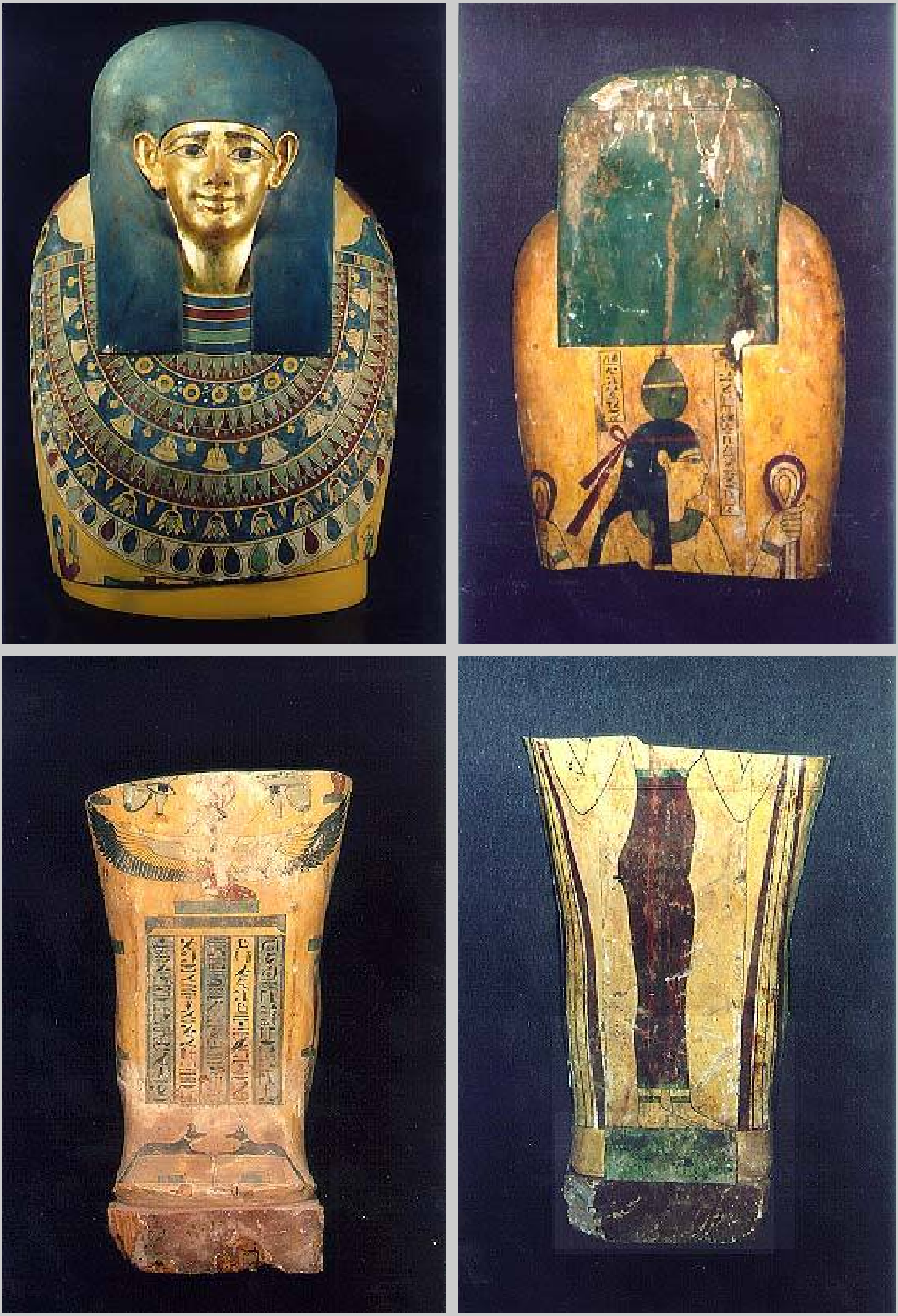
This resulted in an almost clean fracture with minimal loss. The fragments were degreased with a solvent and joined with an acrylic resin. This procedure is almost completely reversible. In the calcareous deposits on parts of the surface only a small hairline crack was visible where the fragments were joined. Retouching was minimal so as not to disturb the weathered and crazed surface.



This ancient Roman aubergine coloured glass vase was covered in calcareous deposits that disfigured and obscured the white decoration flowing through the coloured glass matrix. The deposit was removed with a complexing agent that did not attack the fragile glass surface. At the end of the treatment the glass surface was smooth and reflective again. The deposit was left on the inside and near the rim.

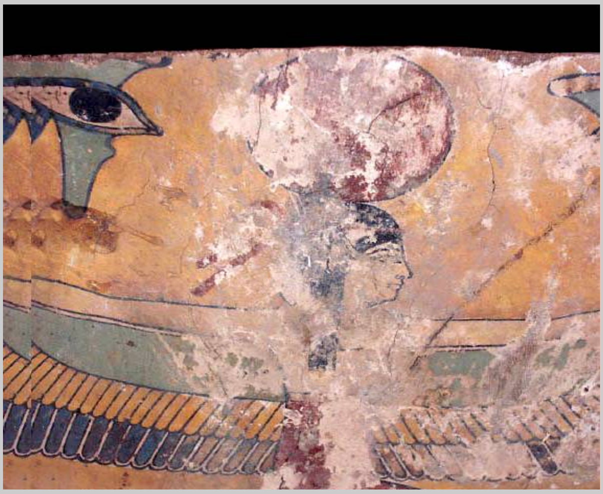


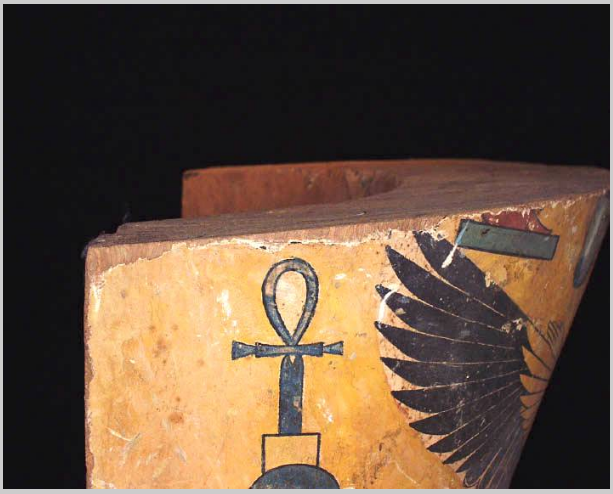
# Organic

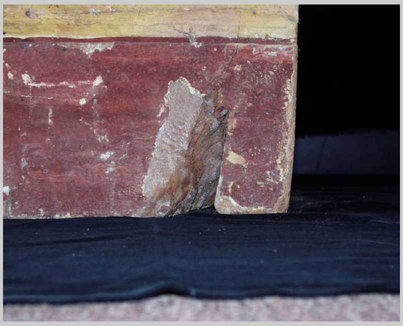


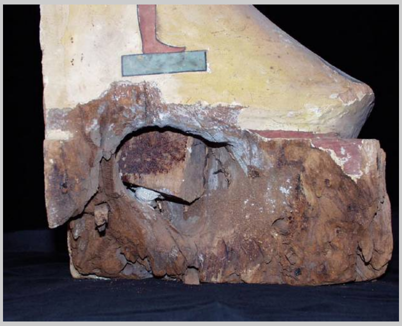
Egyptian gilded and polychromed wood anthropoid sarcophagus of Imenet-Pet, Lady of the house, daughter of Wesir-Nakht. Early Ptolemaic Period, ca. 250 B.C.
Wood covered in gesso and paint, heigh198 cm, width 63cm.

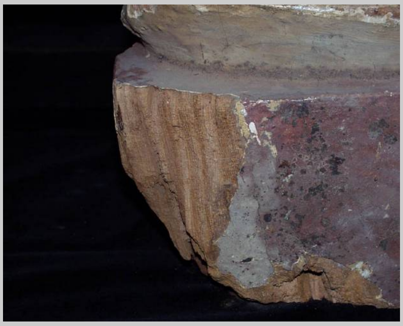
The sarcophagus was assembled from different pieces of wood. The front part had been carved entirely out of one block of wood. Only the bottom had additional wood added to complete the shape of the square base. The back had been assembled out of various pieces and was not the same thickness as the front. The sarcophagus was sawn into four pieces after excavation. This was probably done to make transportation of the bulky artefact easier. The front was cut just underneath the collar. And had a stray cut running from the centre left to the proper right. This is probably where the pieces were originally joined. Cracks had developed due to expansion and contraction of the various wood parts and in some areas the painted gesso was missing. The back had been cut from the left and the right side, and the cuts met in the middle. The cuts also met at different angles. As they didn't meet properly, the bottom half of the front missed some of the decorative paint layer, but the original outline could still be determined. The base was deteriorated and in some areas the wood was missing. On the proper right side of the base a large piece has been originally joined to complete the base. This became dislodged and showed a large hole in the tree branch, which was originally not only plugged shut with this wood addition but also filled partially with lime plaster mortar. The top and bottom of the back were covered in small areas in original resin streaks and droplets. In some areas cracks had developed due to movement of the wood. The surface finish in these regions were partially missing. A crack developed on the back of the head and a hole created due to the humidity changes and the dislodging of the original wood addition where the various pieces were assembled. The interior has gesso in parts, but had not been decorated with paint. The gesso is very thin, dusty and had to be cleaned. The gaps filled and the large dislodged piece in the bottom had to be reintegrated with the rest of the piece. The wood in this area is partially disintegrating due to cell wall collapse.

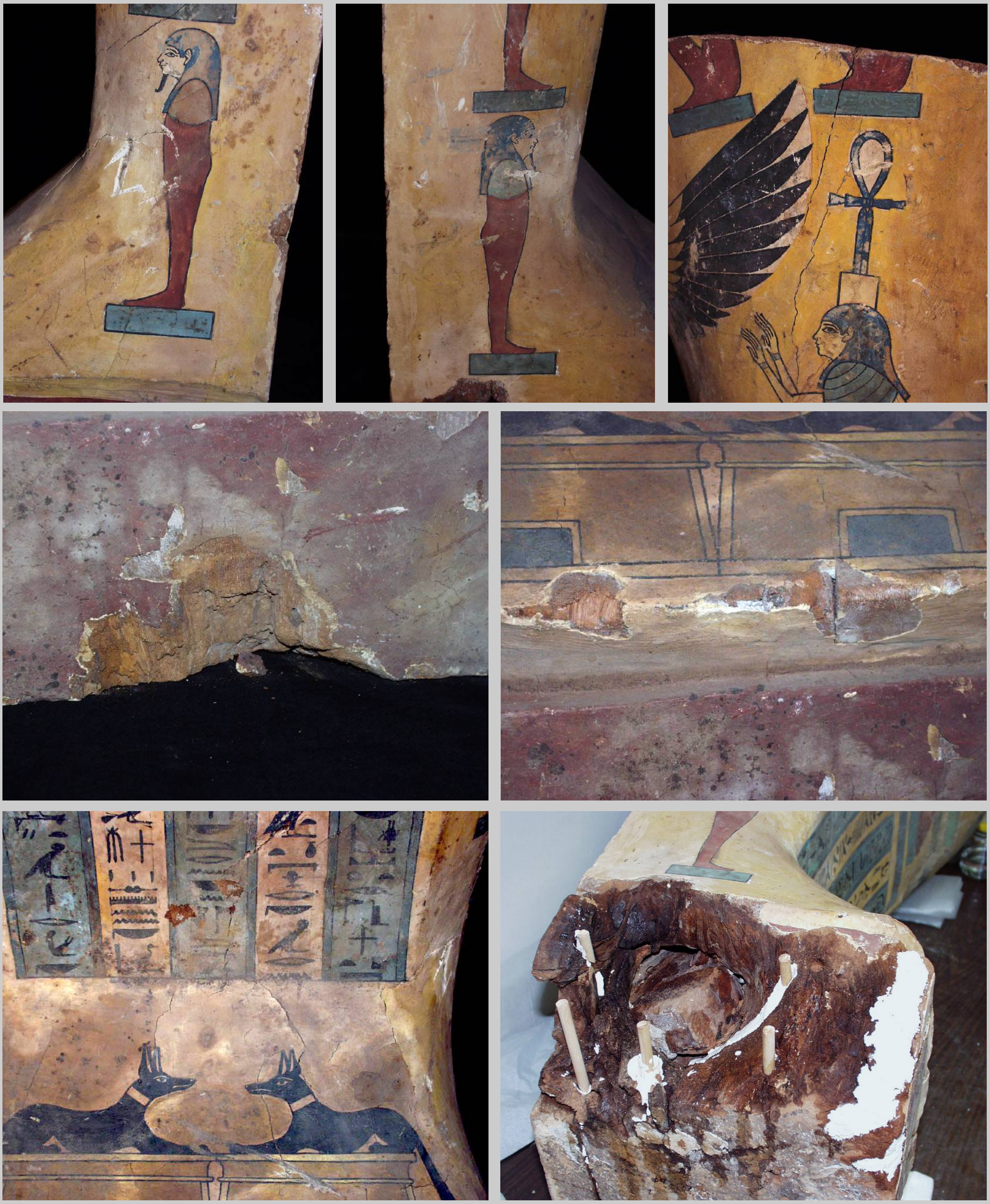




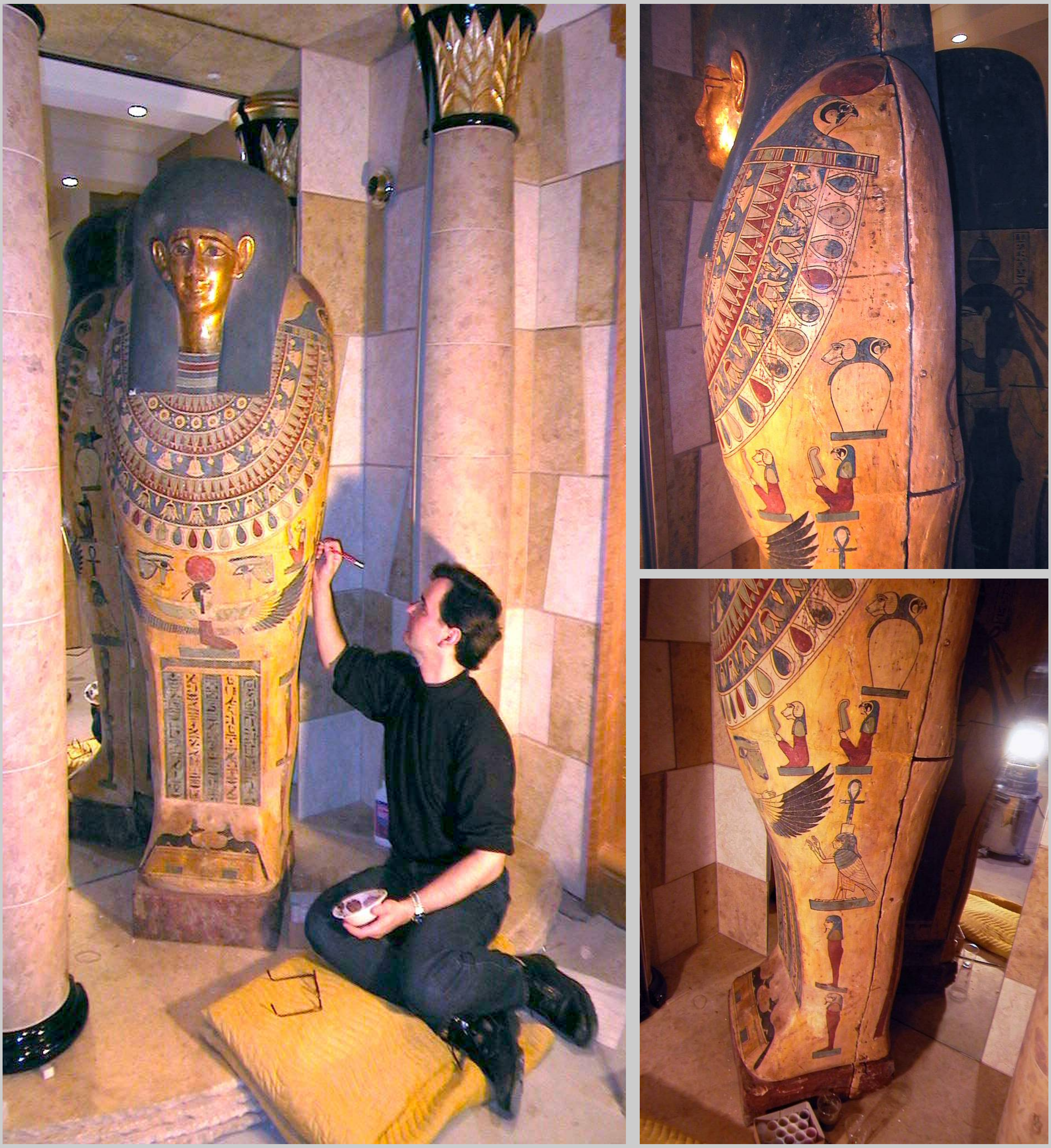




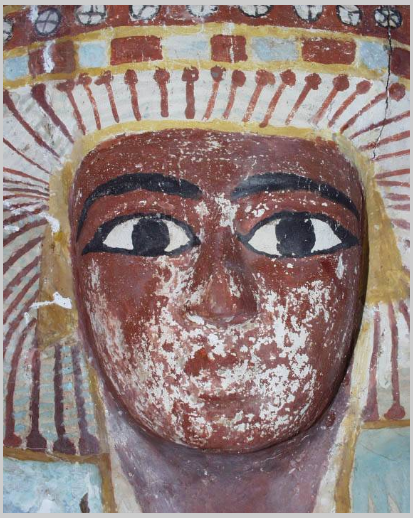


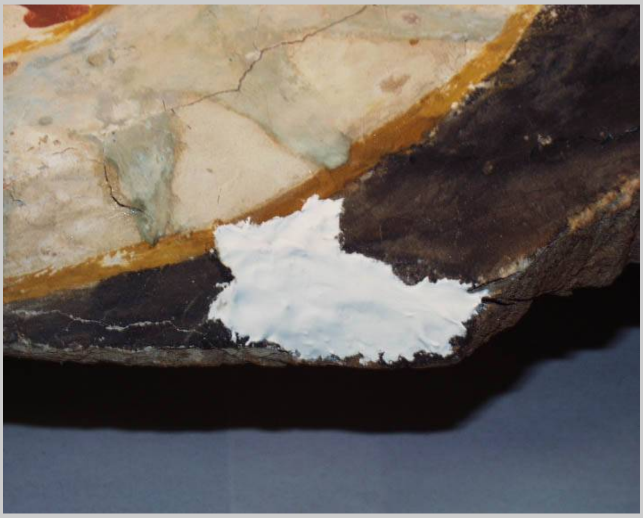


Damage on the sarcophagus and the large missing piece of the front proper right bottom. The large missing piece was remodelled using cotton fibres and polyvinyl acetate. New wooden dowels were inserted to ensure adequate bonding of the modern substitute.

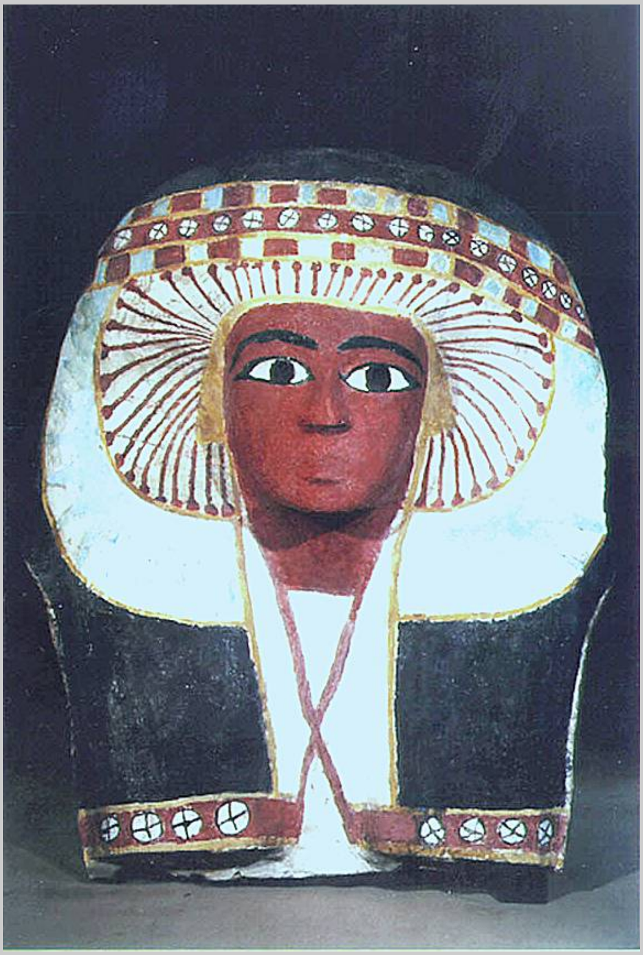


The front pieces of the sarcophagus were joined together with wooden dowels and polyvinyl acetate, gap-filled with gesso and colour matched with acrylic paint. The back was joined by inserting dowels on the undecorated interior and strapped together with polyethylene straps.



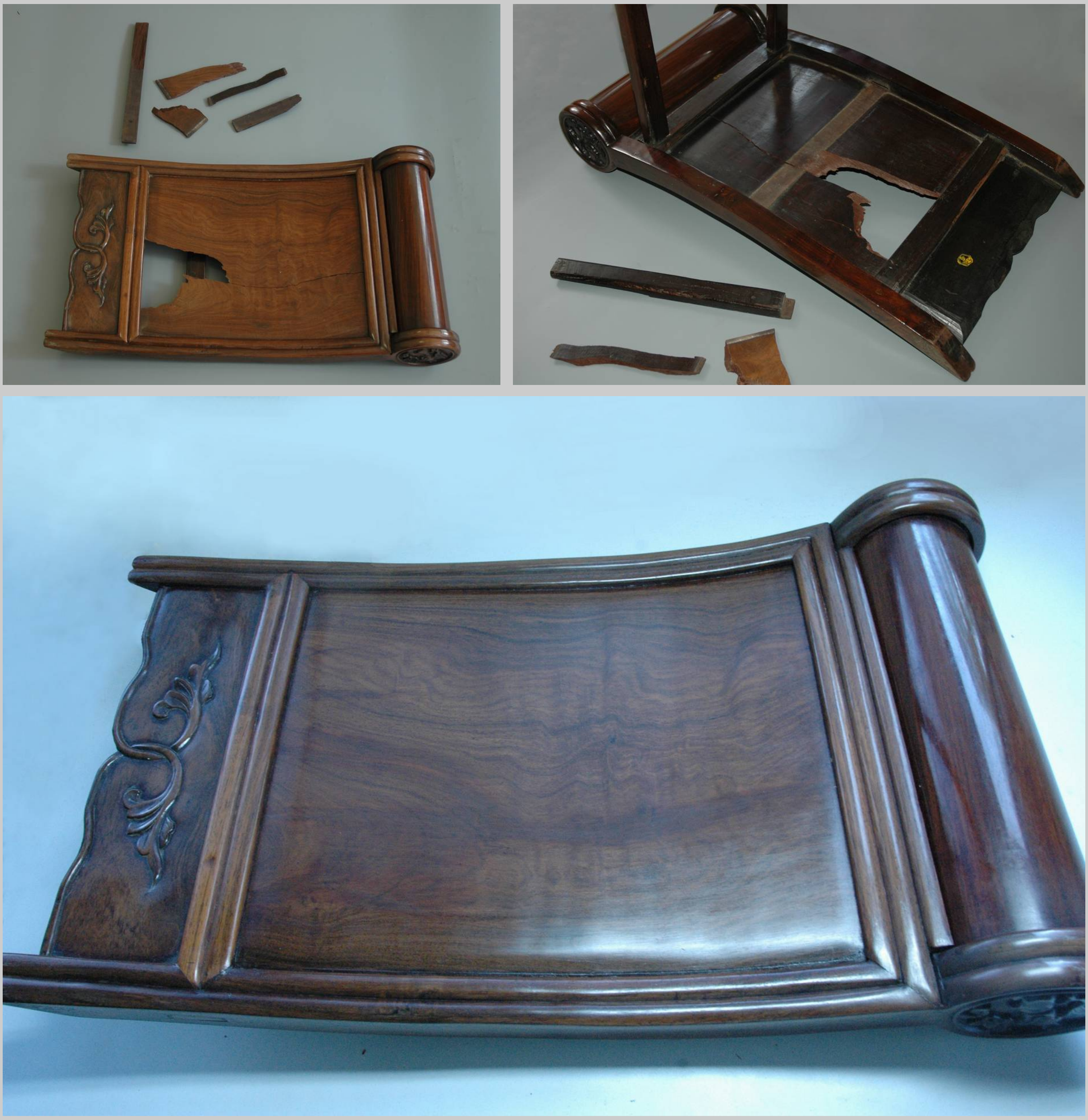


Egyptian poly-chrome wood sarcophagus mask, Late Period (750-30 BCE).

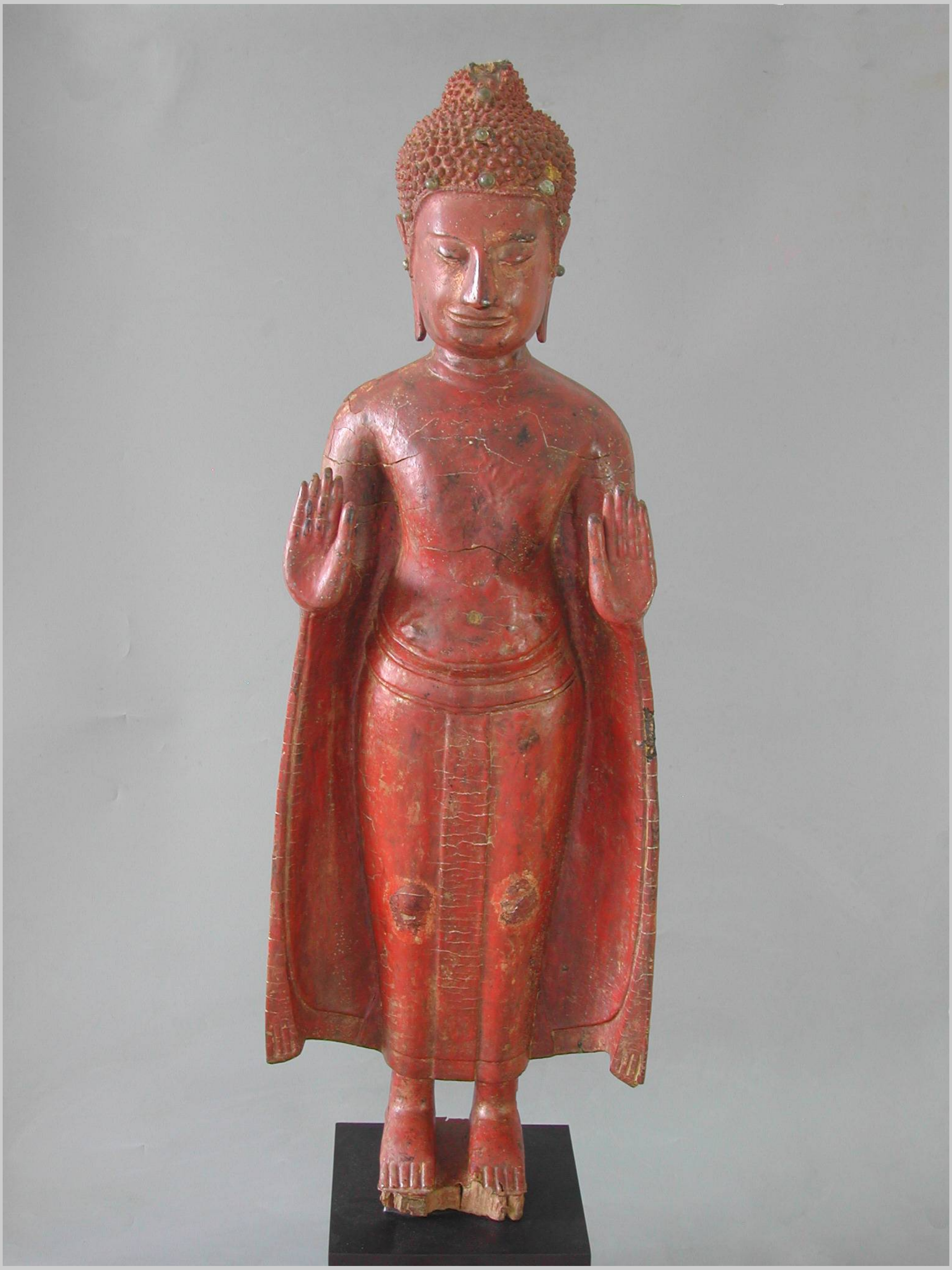


The mask was over-painted by a previous restorer. The paint used was not conservation grade material, rather an oil paint and needed removal since it aged poorly. The surface was cleaned with appropriate solvent and the new additions reversed. After gap-filling the surface with a gesso filler, the missing areas were retouched using reversible acrylic paint.

The restored face appears rather intensely coloured, this is due to the colour matching of the original oxide red. Only minute areas were overpainted.

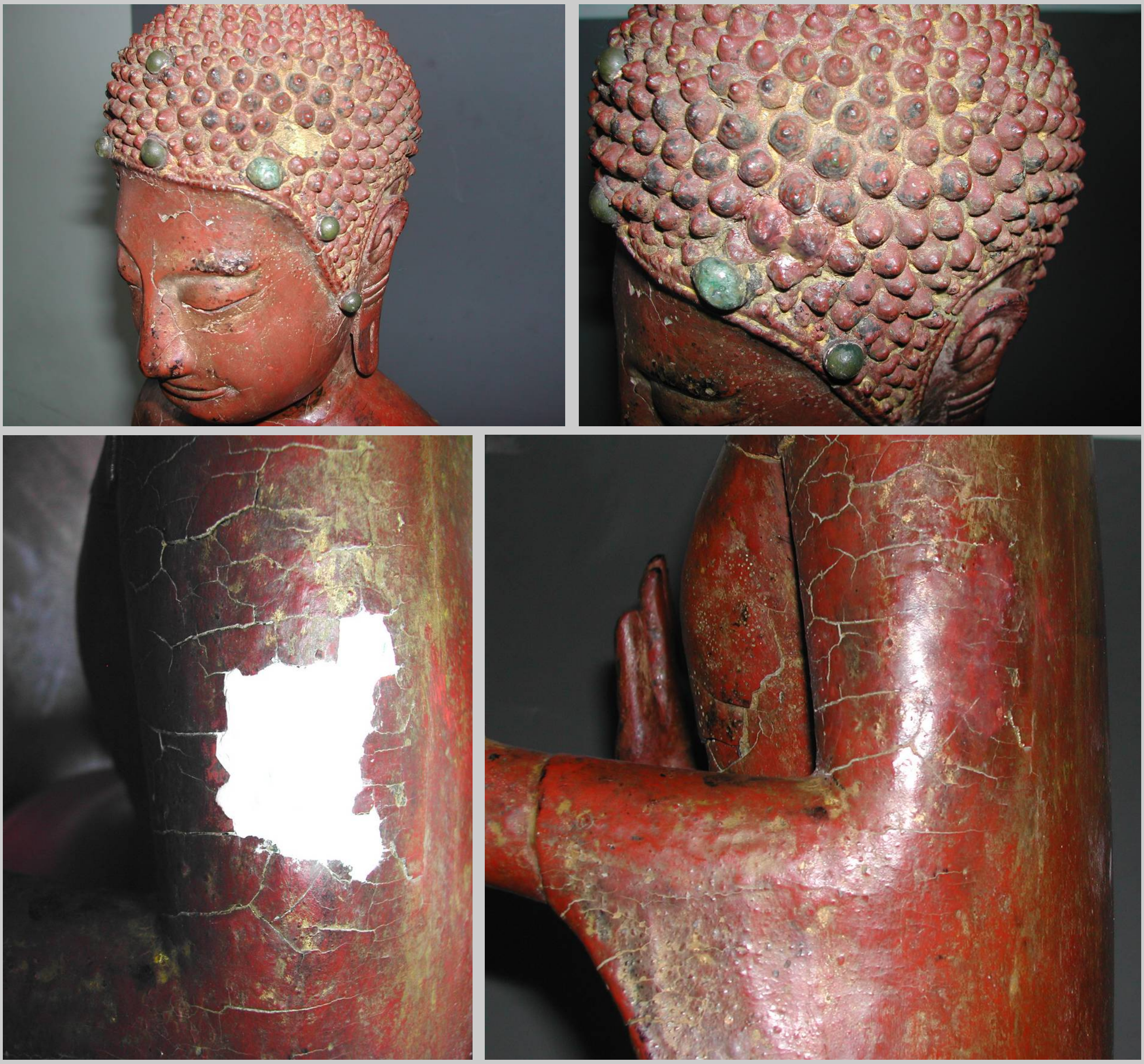


Antique Chinese foldable rosewood backrest. The main panel was broken into various fragments. The pieces were joined with a polyvinyl acetate adhesive, the cracks were filled with binder and wood dust. This was followed with a coating of a solvent based lacquer This procedure is not reversible and is considered a complete restoration.

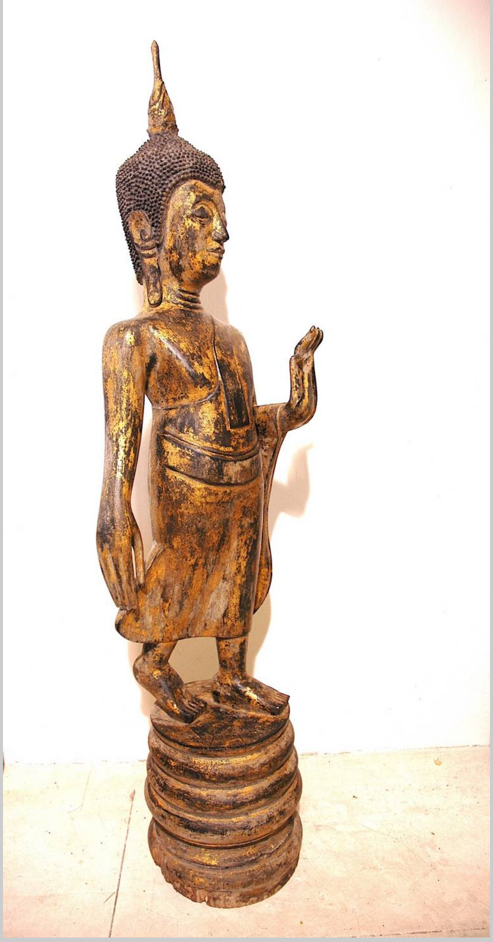


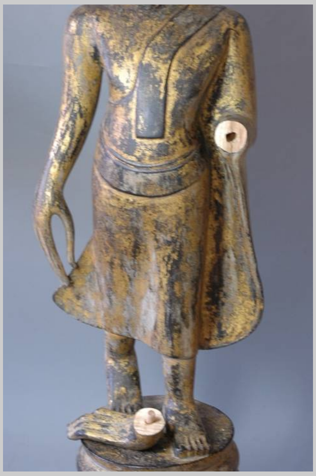
Thai red lacquered standing Lao Buddha, 19th Century.

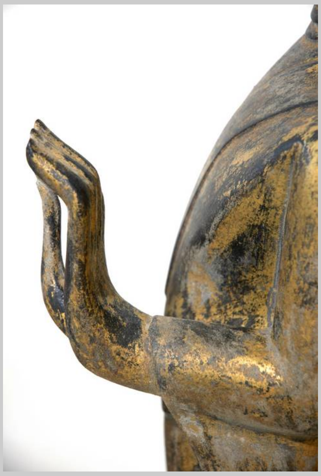
The lacquer had cracked due to age and humidity fluctuation. On the head and proper right arm some lacquer is missing and needed to be replaced.

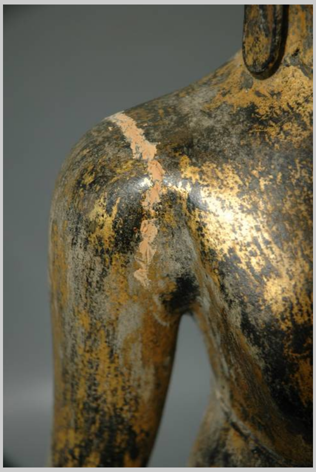


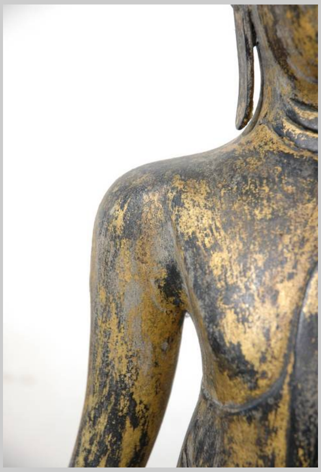
The missing areas were cleaned and gap-filled using a gesso mixture containing polyvinyl acetate. The surface was then levelled with the original lacquer surface and colour matched with acrylic colour. There was little overpainting and no covering of the new paint with dirt to hide the conservation-restoration. The entire treatment is almost completely reversible.

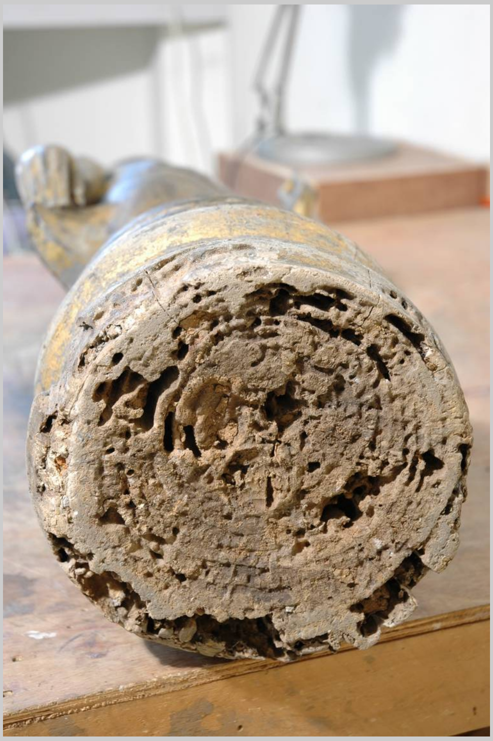




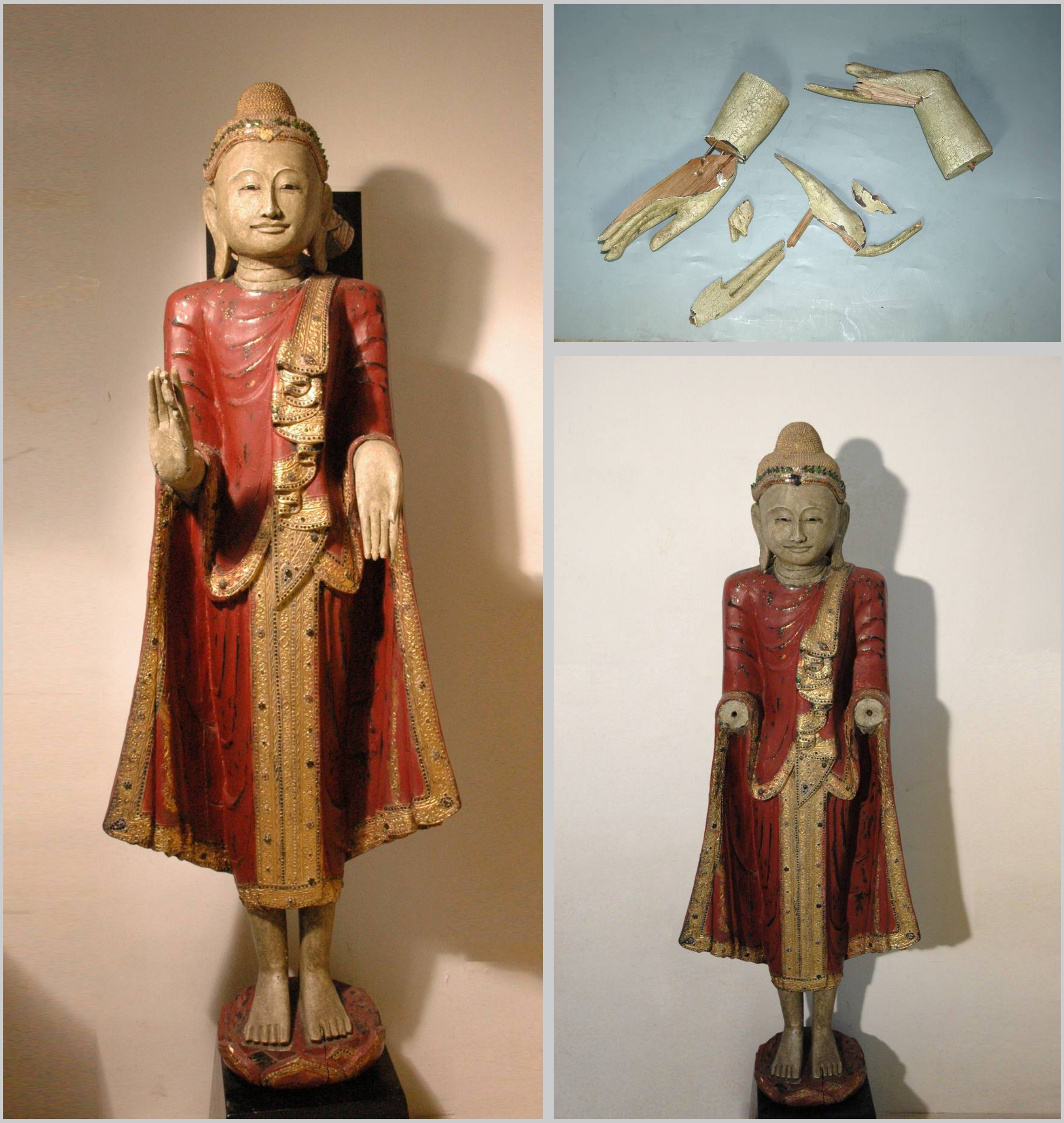




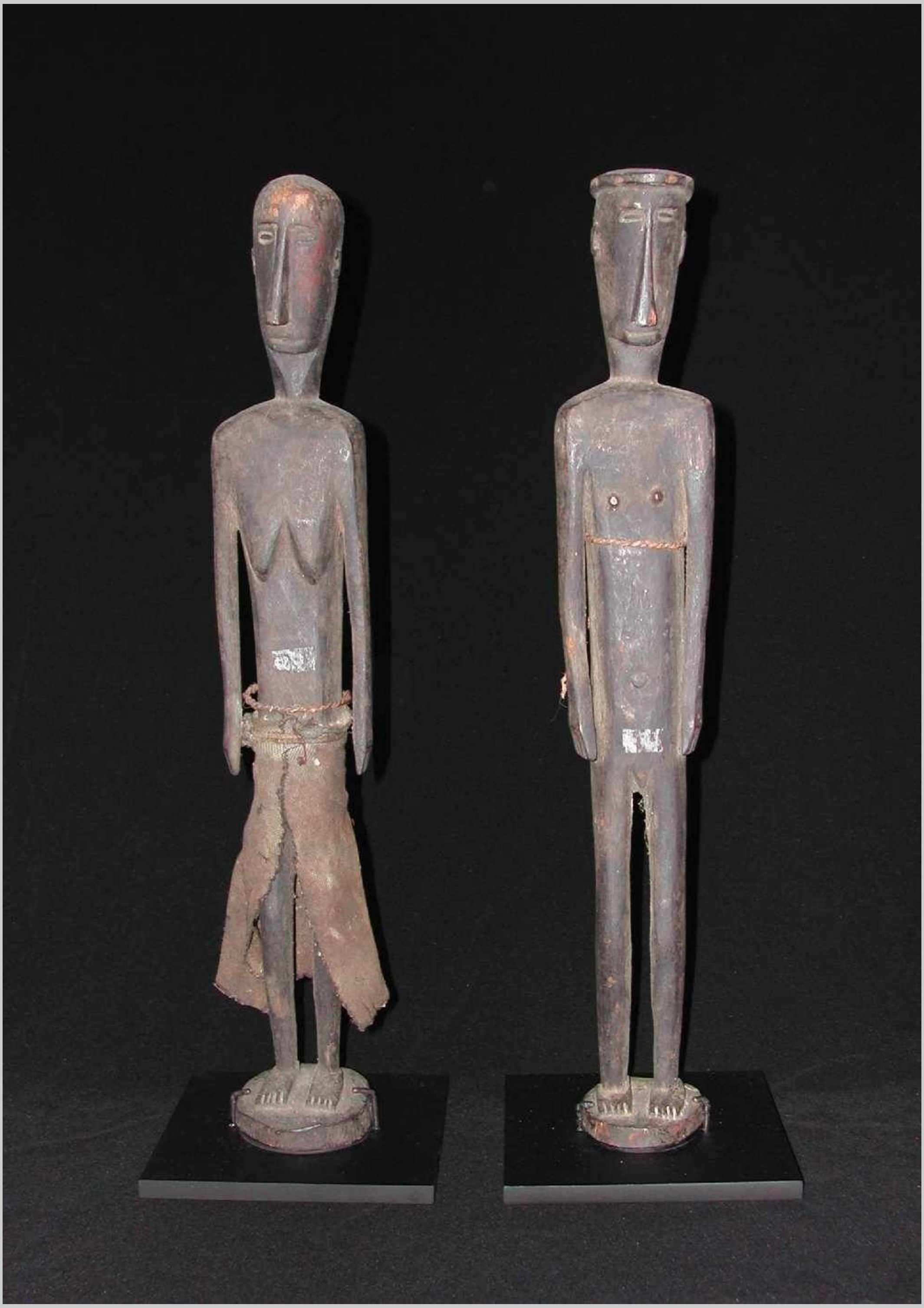




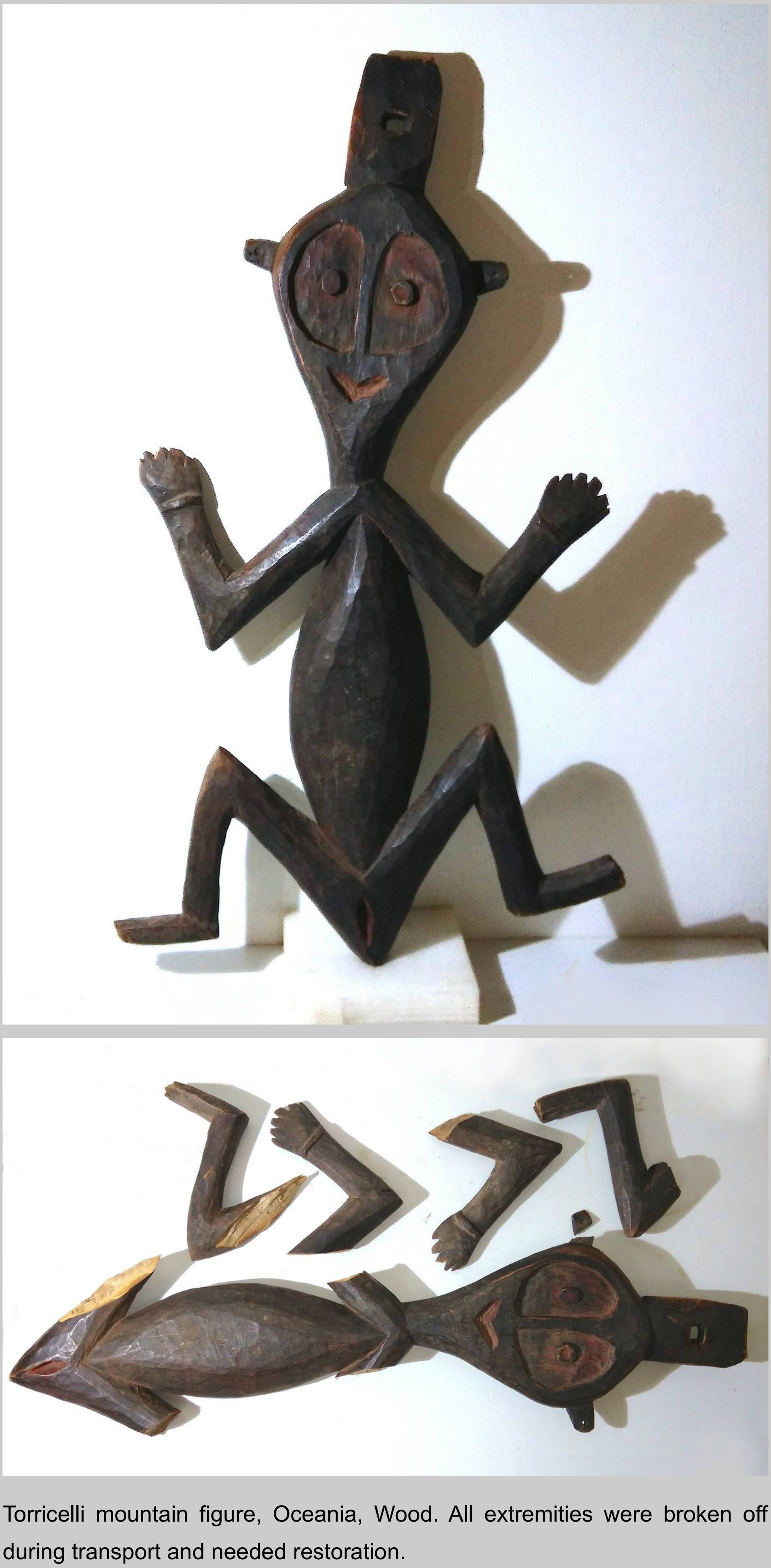
Wooden standing Lao Buddha, 19th century. The surface still contained the original lacquer and gilding. The underside of the wooden base of the sculpture showed severe insect frass that was not active. The proper left hand was fractured at the wrist and was joined with a wooden dowel using a solvent based polymer. The proper right shoulder contained a large fissure. This was consolidated with a solvent based polymer. All cracks were filled with a cellulose based filler, levelled and colour-matched using acrylic colours.



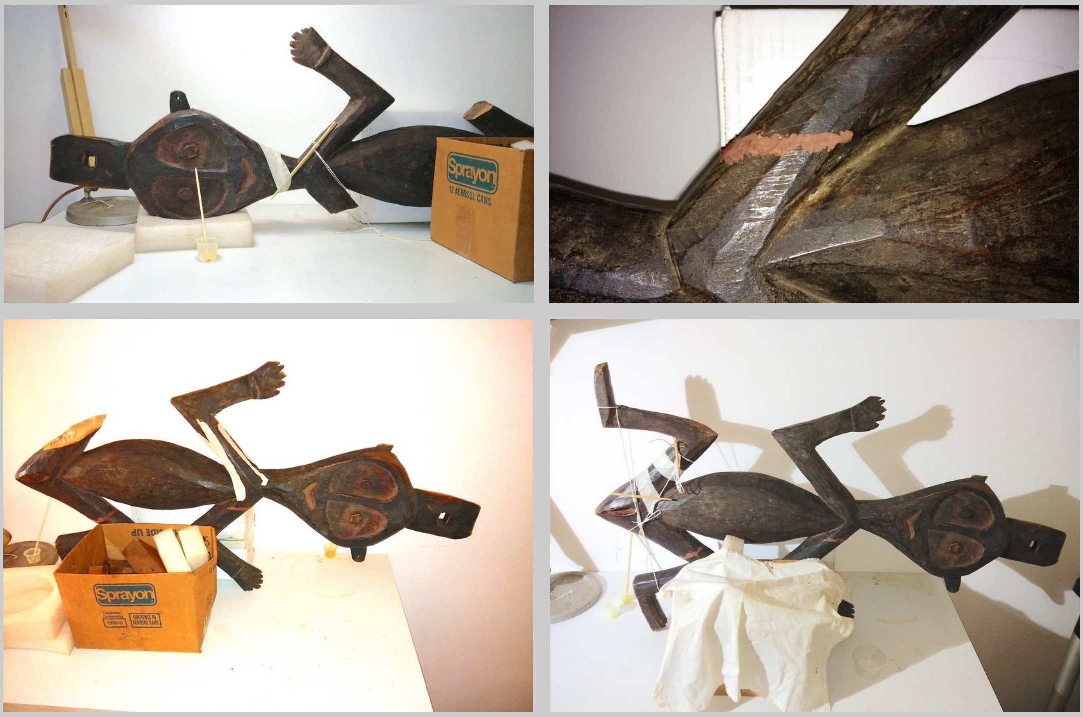
Modern South East Asian standing Buddha. The fractures of both hands clearly show the construction of the hands. The damaged hands were reconstructed using synthetic adhesive and a cellulose filler. The fills were colour matched using acrylic paint. New dowels were inserted to secure the hands.



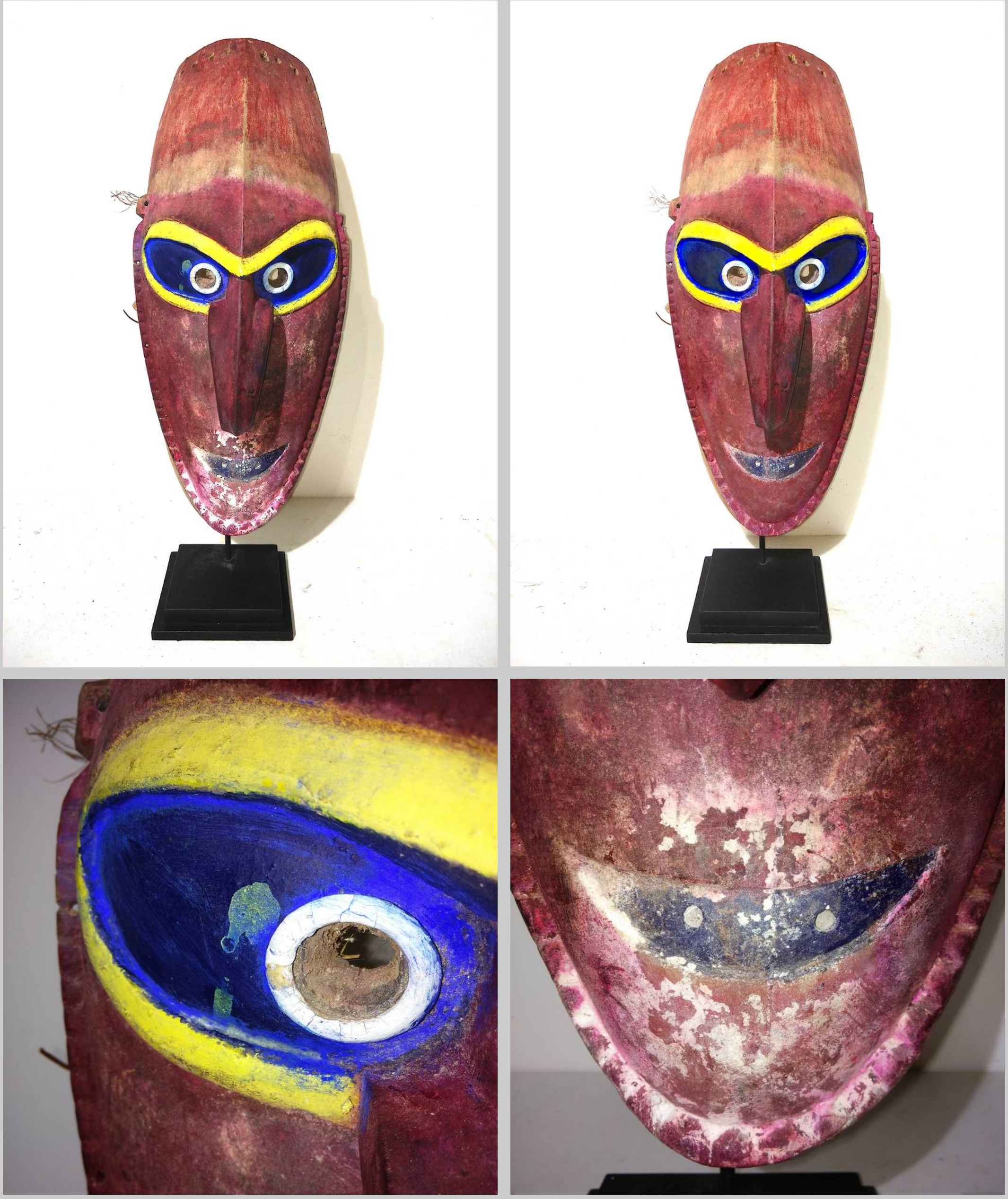
A couple of Atauro Island Indonesia wooden figures that were unstable standing on their wooden base. The underside of the base was cast in a polymer to allow the figures to stand horizontally these imprints were mounted to a stainless steel square base. These were coated in black acrylic paint and the figures were secured to the base with polymer covered copper pins. Small clear rubber feet were glued to the underside of the mount to prevent scratching of surfaces.



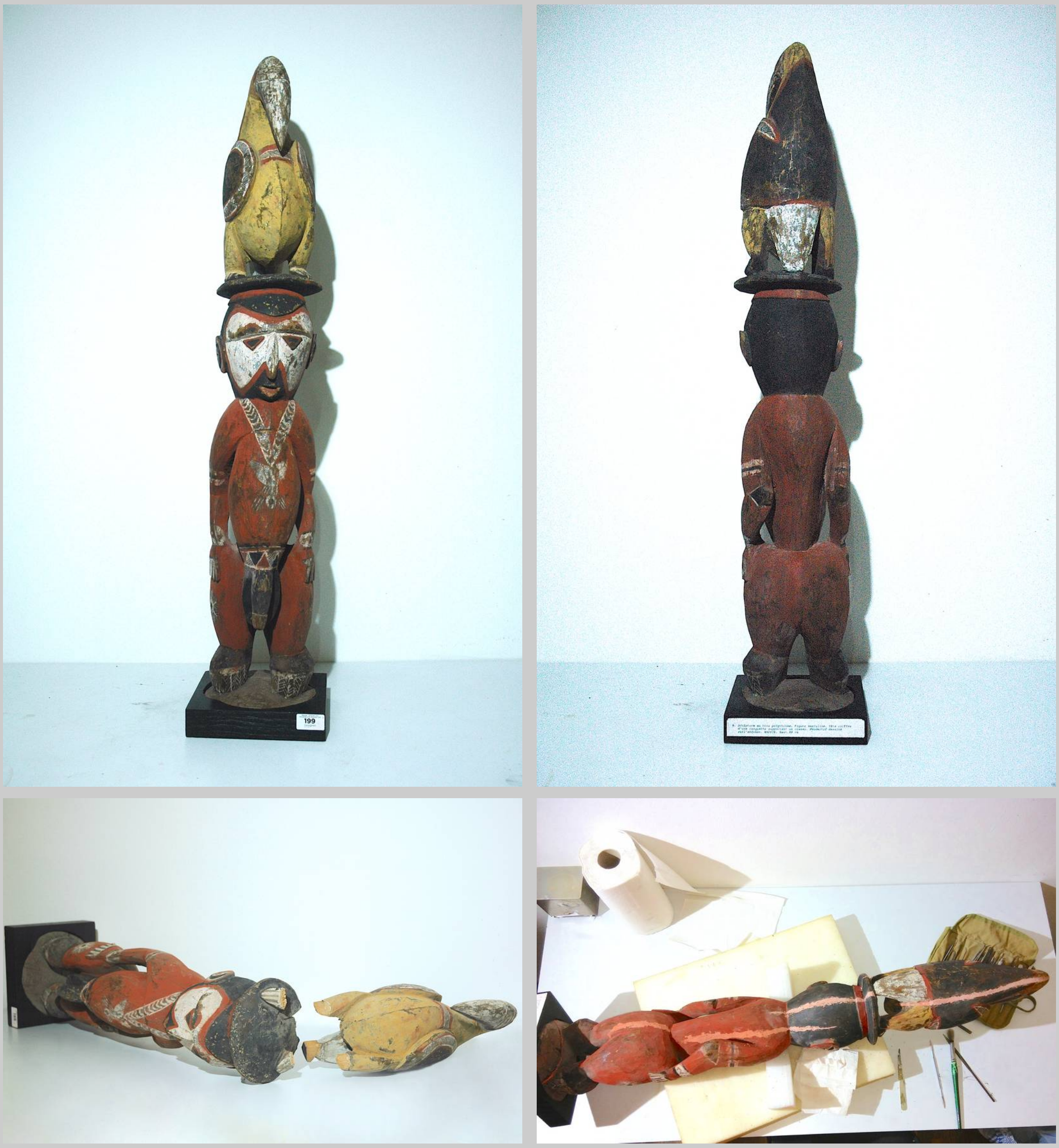
Torricelli mountain figure, Oceania, Wood. All extremities were broken off during transport and needed restoration.



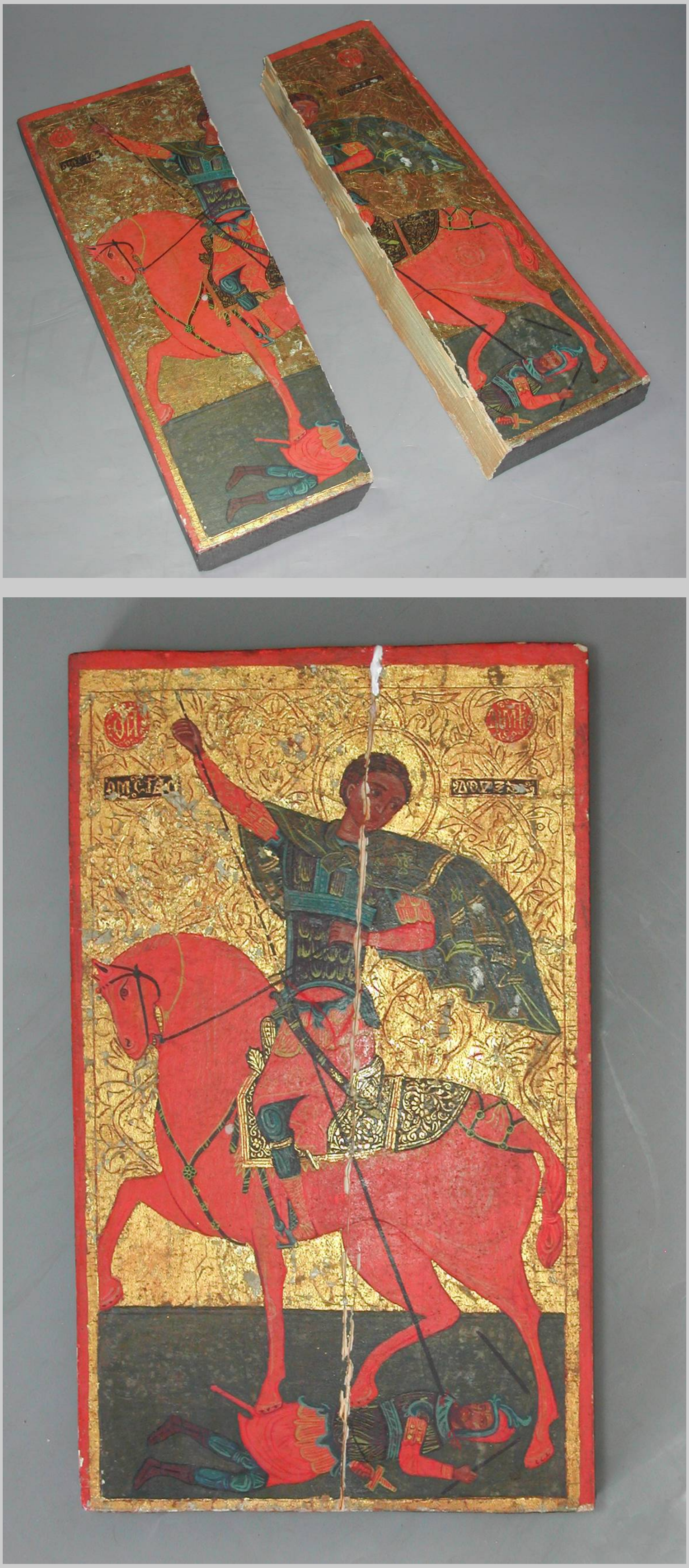
The fractured surfaces were clean and only needed some surface dusting. The fractures were doweled and wooden pins inserted to reinforce the bond. The pieces were joined with a water based synthetic glue. The remaining fracture-cracks were filled with a cellulose filler. After levelling the fills the surfaces were colour matched and protected with a synthetic coating.



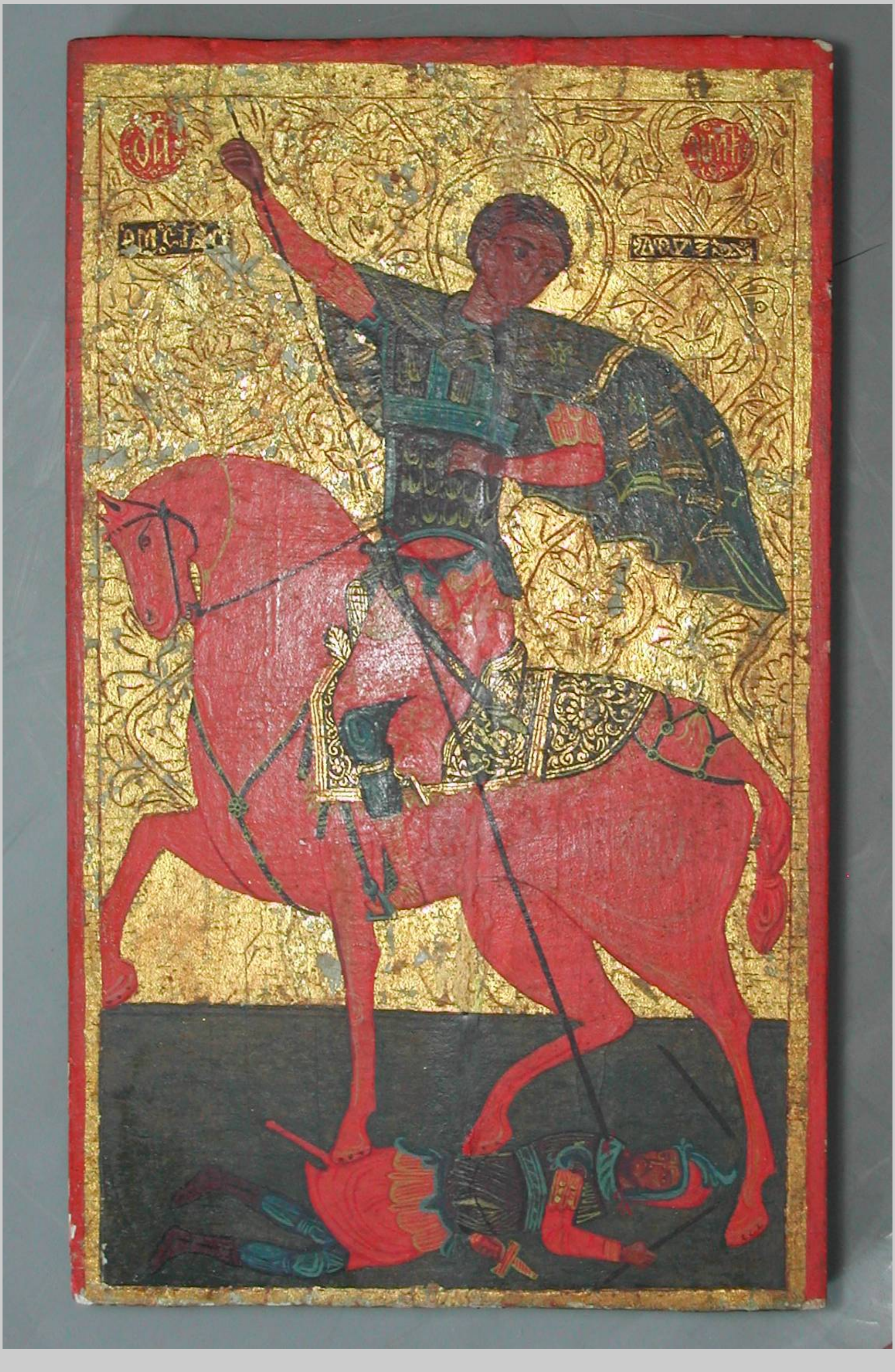
Wooden Mask, Papua New Guinea (probably 20th century). The lower part of the face and the mouth were covered in a white deposit of mineral nature. There was also some yellow staining in the proper right eye Sclera. The deposits were removed mechanically. No further action was necessary.



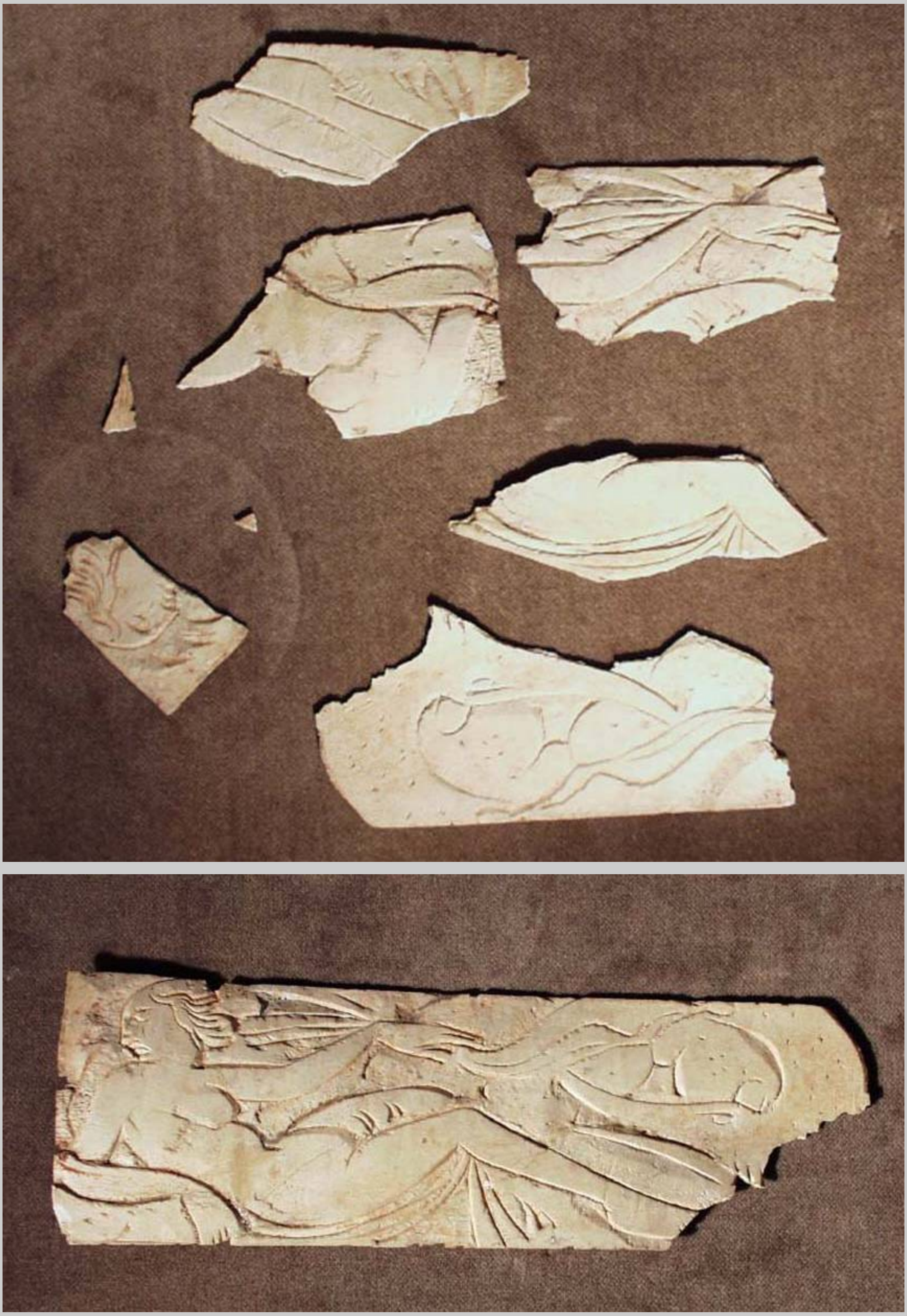
Wooden Man with Bird, Oceania. The birds ankles had fractured. There were various cracks on the back of the sculpture, due to humidity changes. The bird was joined to the main sculpture using synthetic resin. All the gaps were filled with a mineral filler using synthetic binder. After levelling the fills, they were matched with mineral pigments.



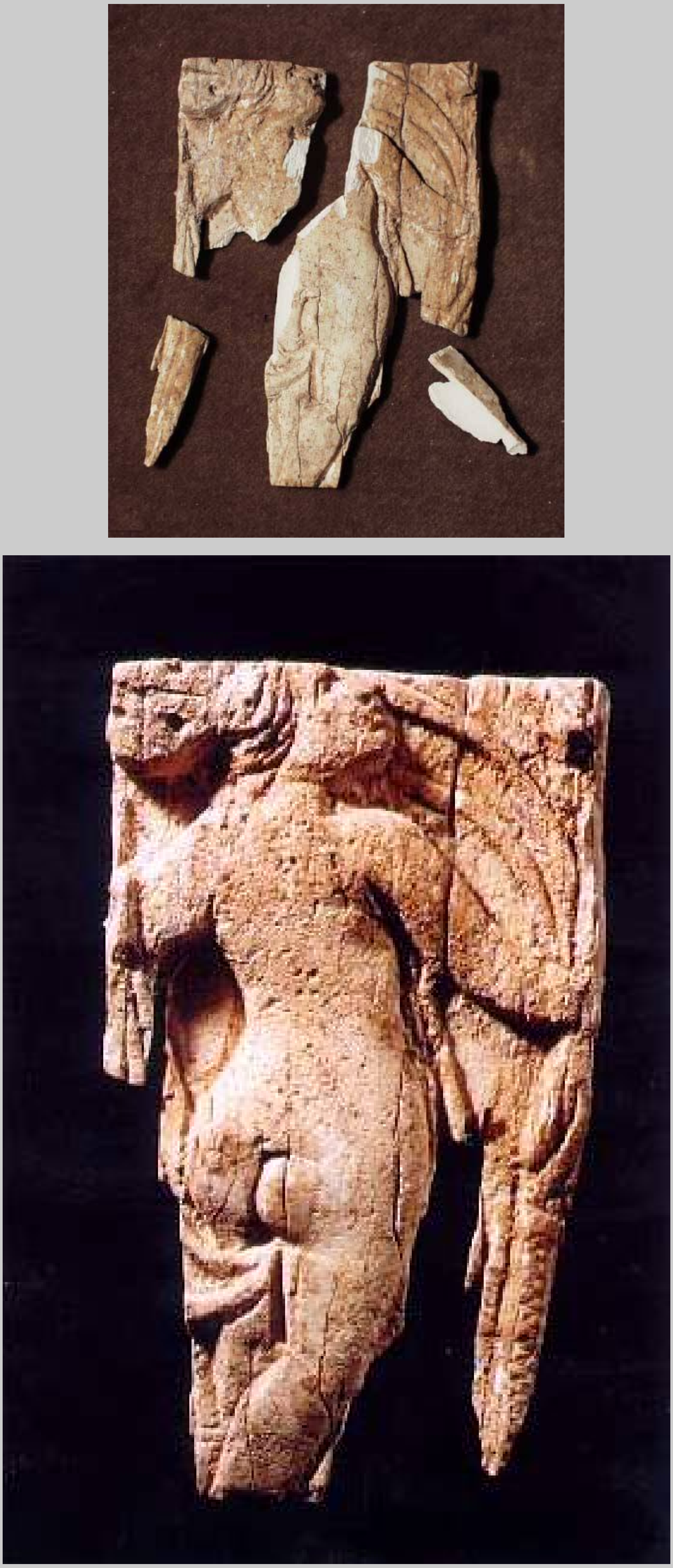
A broken wood panel painting in two fragments. Since it was a clean break, the two parts were joined with a polyvinyl acetate adhesive and left to dry. This was followed with a gypsum filler.



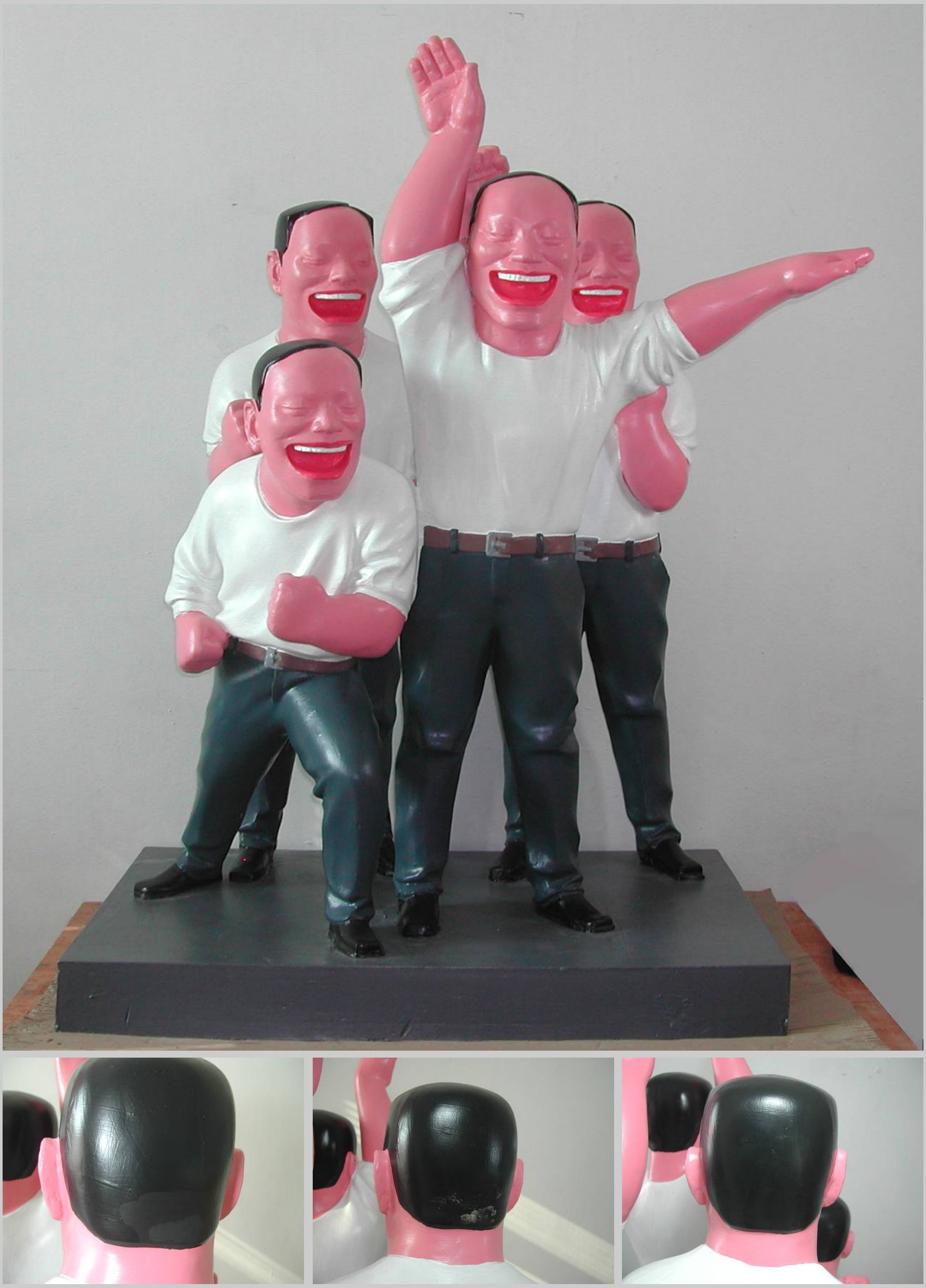
This modern panel painting had sentimental value to the owner so it was treated like other artworks and the conservation materials used were all reversible.



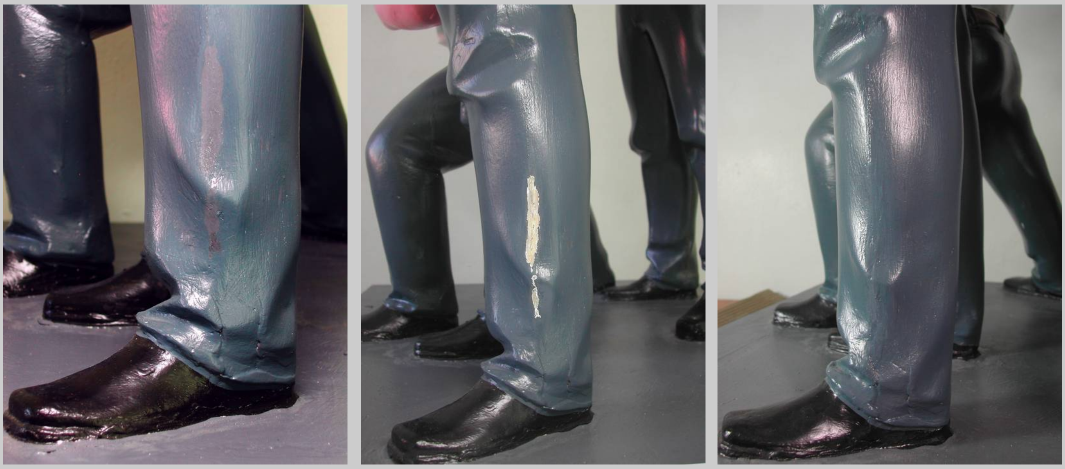
Ancient Egyptian ivory lid; the fragments were cleaned and joined using a reversible acrylic adhesive. The gaps were filled with an acrylic filler and colour matched with acrylic paint. The whole treatment is reversible with solvents.



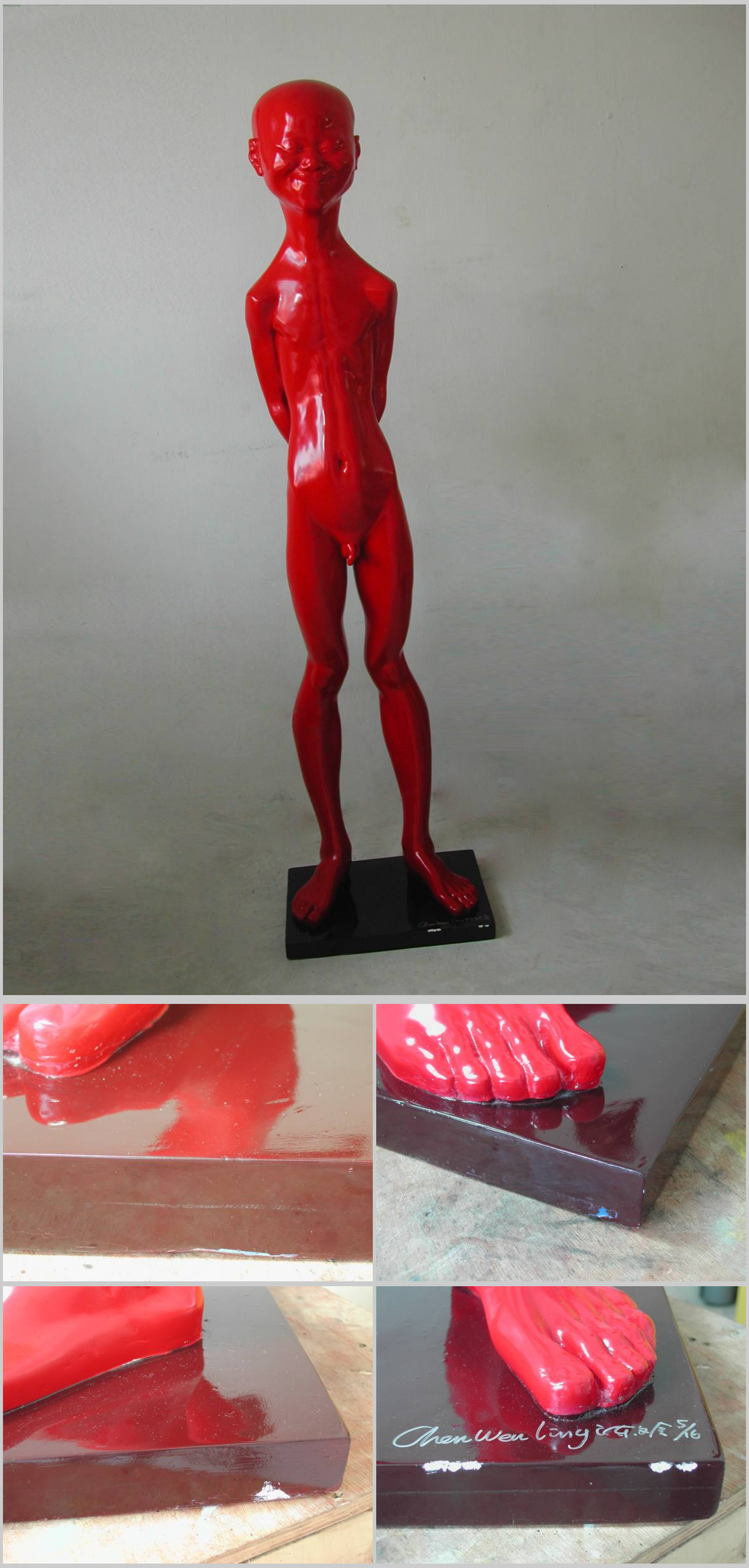
Roman bone plaque. The bone was newly fragmented. The pieces were joined with an acrylic resin. The same resin was used mixed with calcium carbonate to fill the missing areas. The fills were matched with acrylic colours.



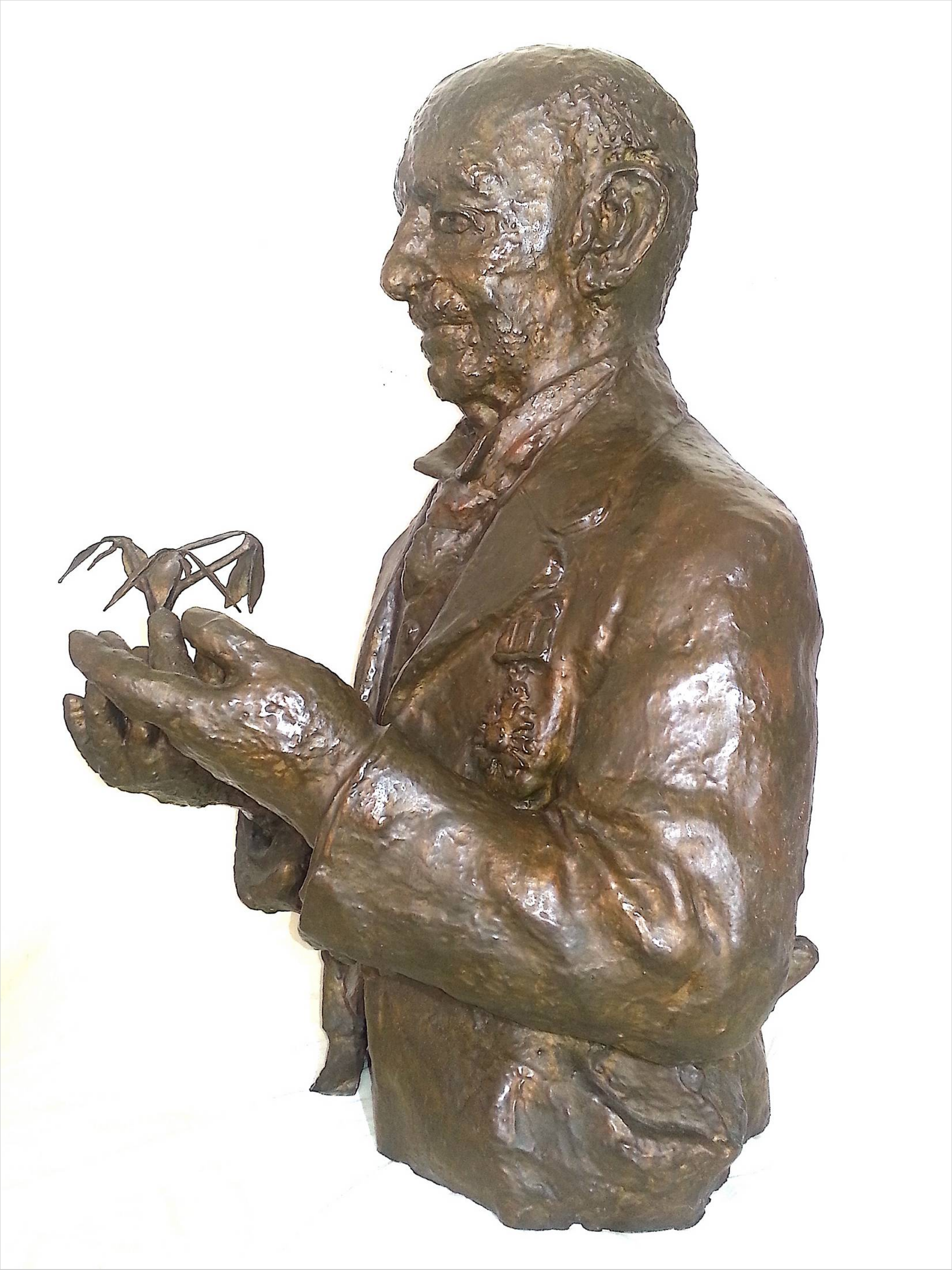
Yue Minjun (1962), polyester and fibreglass painted. The sculpture was previously restored using oil paint, that never dried and was the wrong hue. There were numerous smaller and larger areas that needed cleaning and conservation.



The oil restoration was removed with solvents. The areas were thoroughly cleaned and gap-filled with a synthetic filler. After levelling the fills were colour matched using mineral pigment based synthetic paint. The new treatment is completely reversible in all retouched areas.

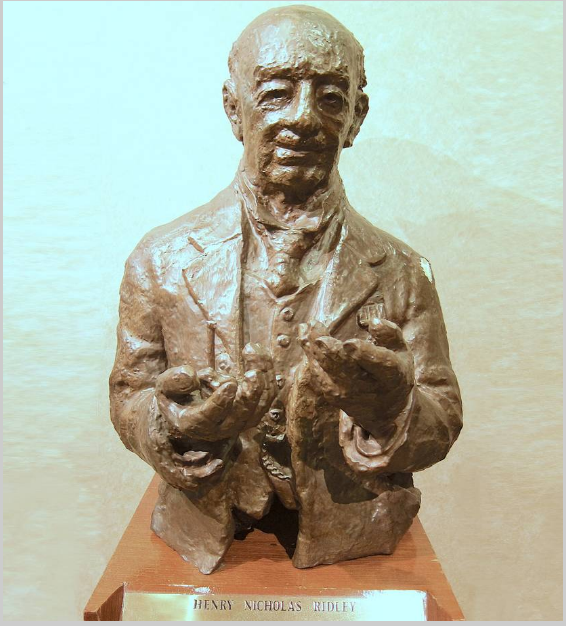


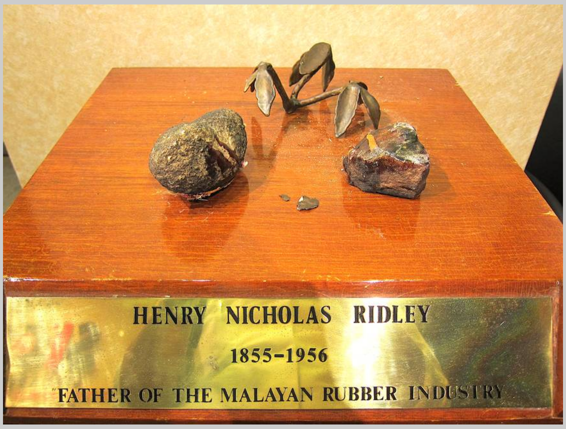
Chen Wen Ling 5/16, polyester fibreglass 5/16. Various areas were chipped and scratched. The blemishes were cleaned and filled with a mineral filler containing a synthetic binder. The fills were levelled and painted with reversible paint. The surface was then coated with a clear coat.



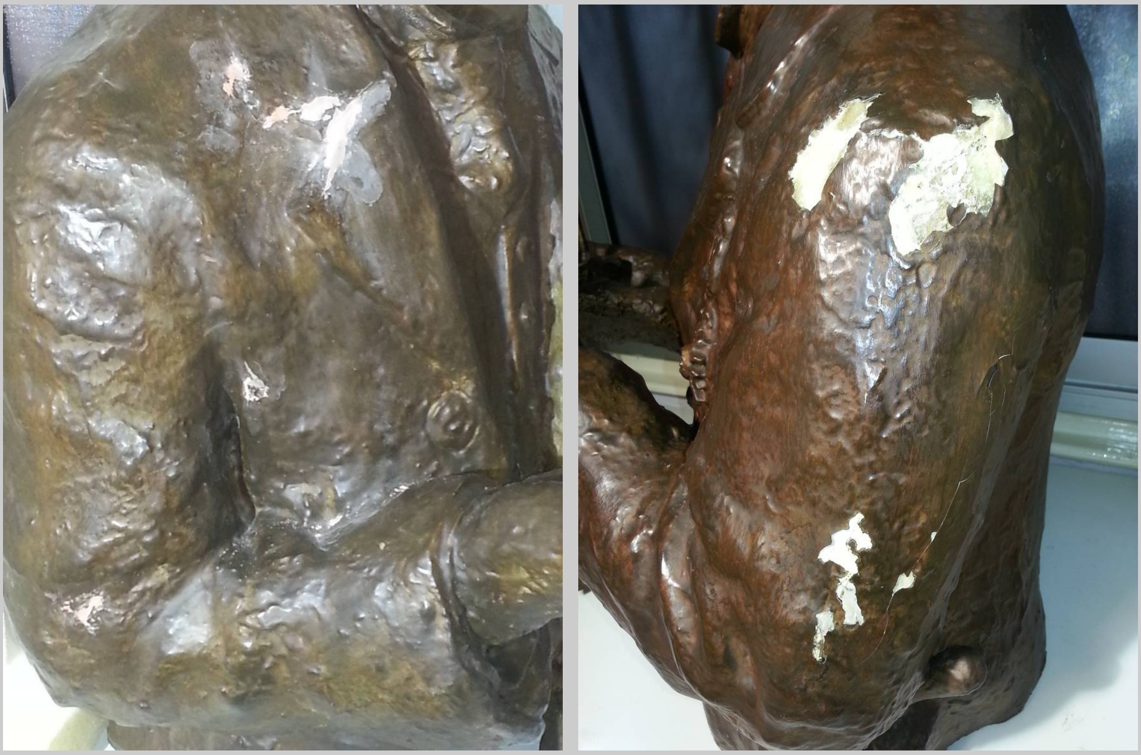
Henry Nicholas Ridley, Polyester and Glass-fibre painted. H N Ridley (10 December 1855 – 24 October 1956) was an English botanist, geologist and naturalist who lived much of his life in Singapore. He was instrumental in promoting rubber trees in the Malay Peninsula.

The sculpture was heavily damaged, cracked and some of the paint coating was missing. The rather light sculpture was weighed down by two rocks glued into the base.

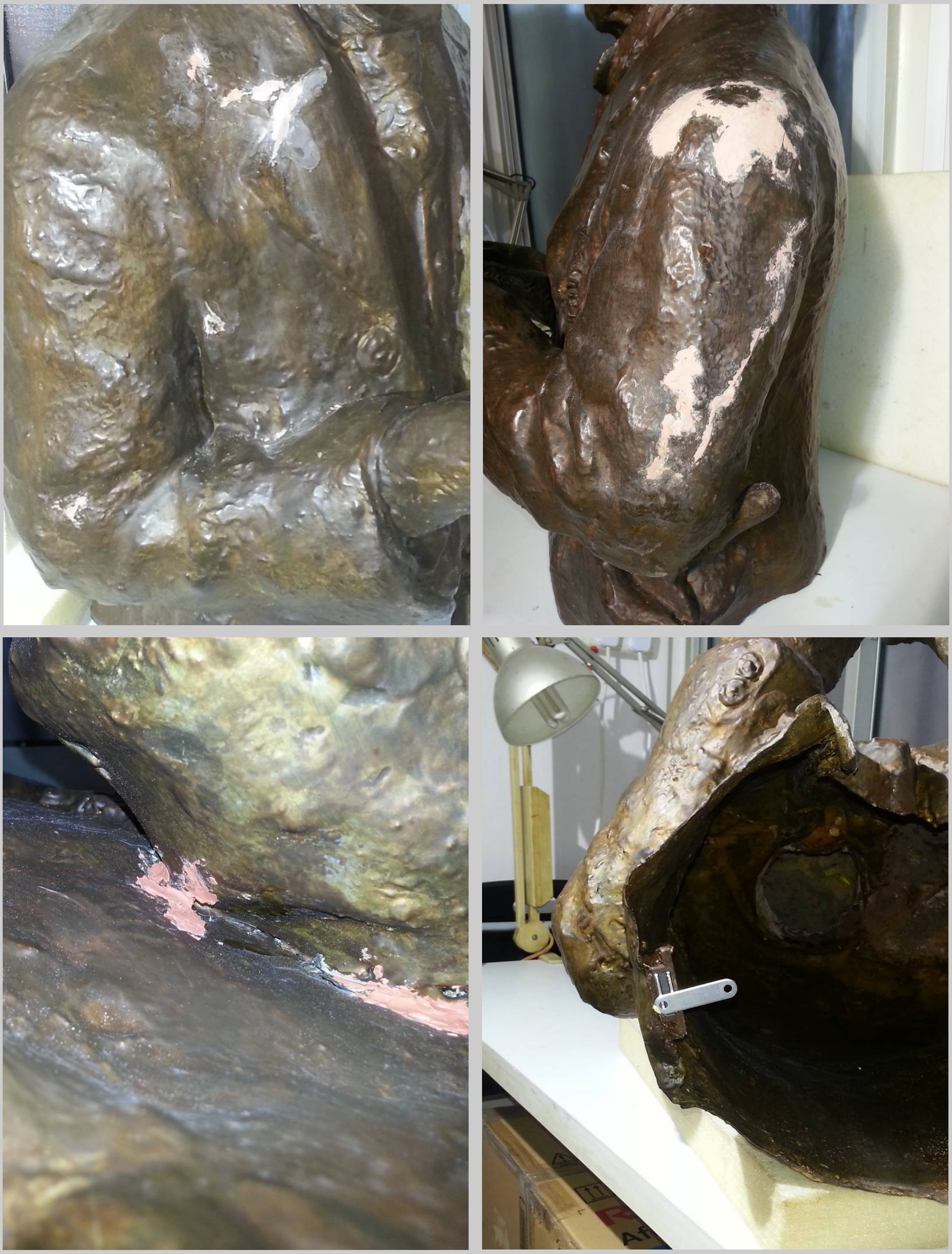




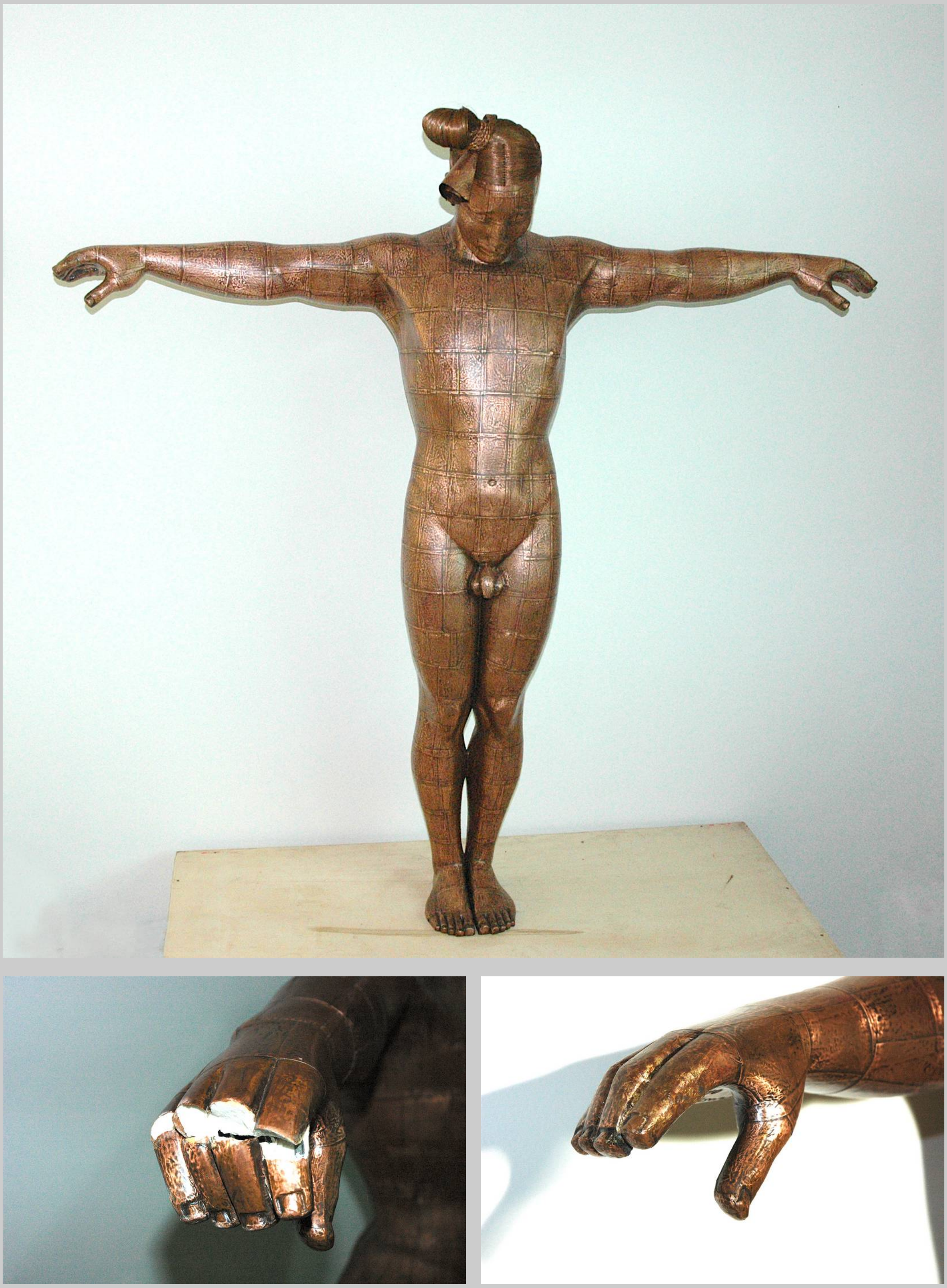
The sapling in his proper right hand was fractured.



The brown paint was flaking in various areas and needed to be secured using a synthetic solvent based resin.

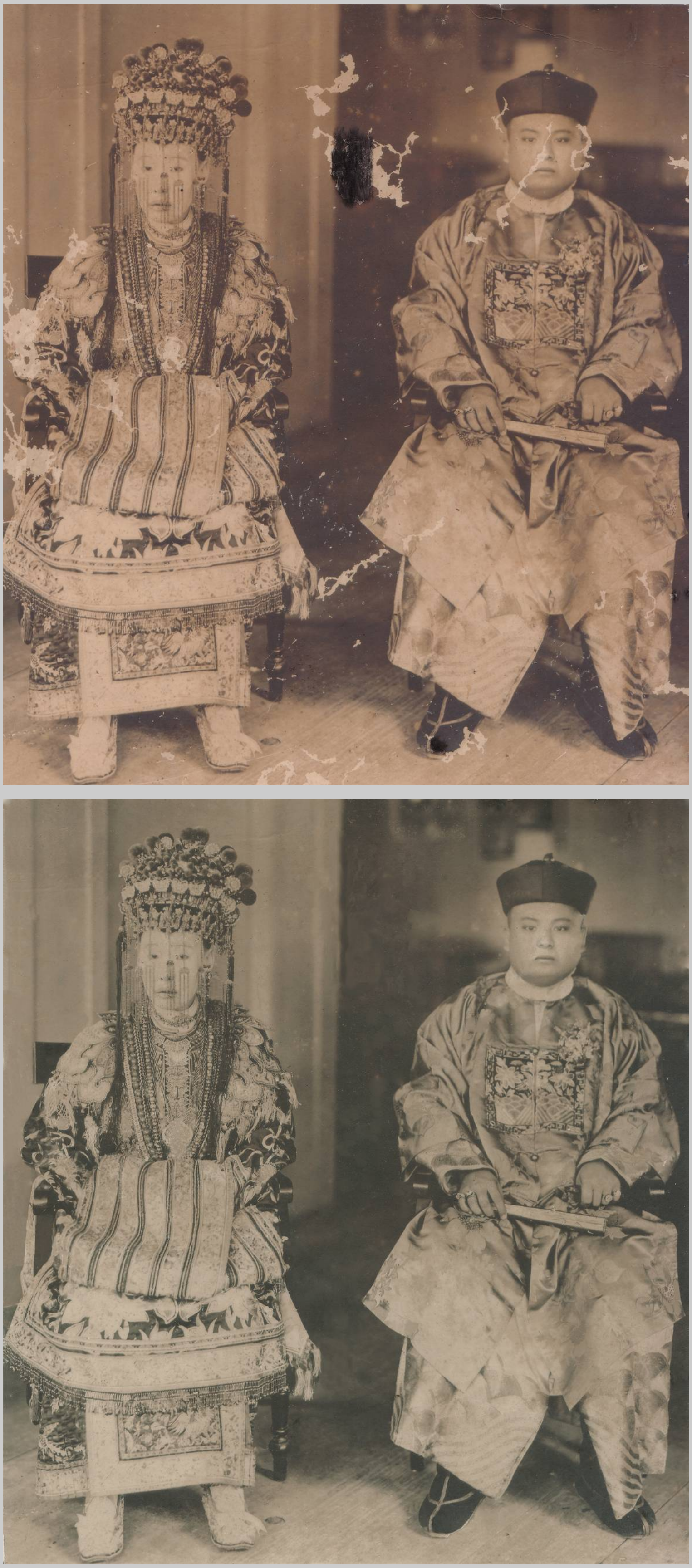


After consolidating the flaking paint, the missing areas were filled with a cellulose based synthetic filler. The fills were colour matched with acrylic paint. To secure the sculpture to the base a commercial cabinet door magnet was glued into the inside of the bust the matching ferrous metal plate could be glued or screwed to the existing base. It was strong enough to keep the sculpture in place without massive invasive mounting.



Cai Zhisong, Ode to Motherland No. 7, Glass Fibre Reinforced Resin, Brass Wires, Copperplate, 120 x 118 x 30cm.

Due to a transportation accident the proper right hand was damaged. All fingers other than the thumb were fractured. The fingers and the copper sheet were bent backwards and fastened with a synthetic resin. The remaining gaps were filled with a filler that was colour matched with the copper coloured sheet and lacquered with an acrylic lacquer.



Antique Peranakan wedding photo. There was a previous attempt at restoration. I digitally restored the damaged areas and did not interfere with the original material.

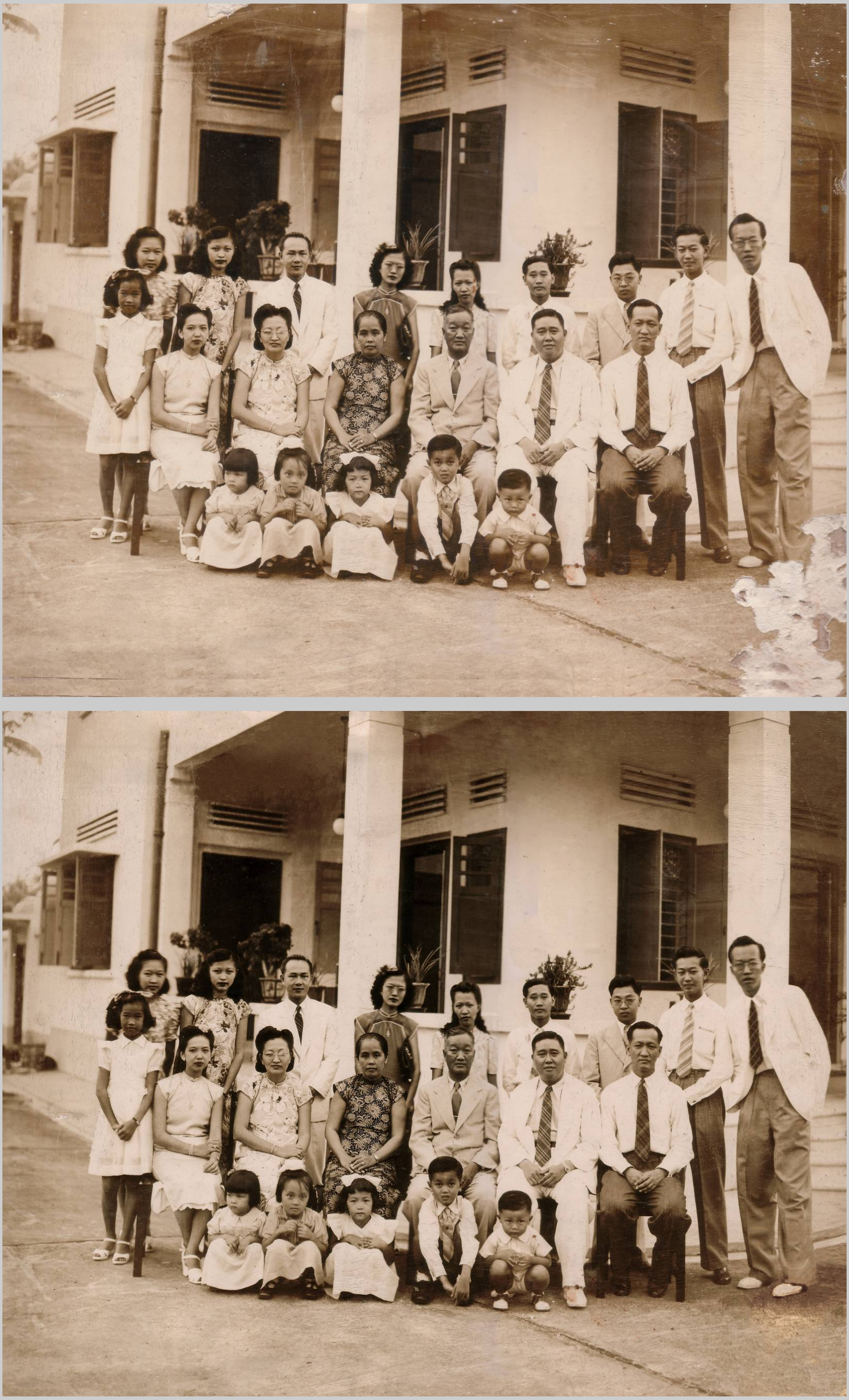


Photo of a Singapore (Peranakan) Teo family (1940s). It was decided to digitally restore the image. In this manner the original substance of the photo was not disrupted and the copy could be displayed.

# Biography

My grandfather started in 1939 as a Art-Preparator in Munich for the Glyptotek a museum for Greek and Roman antiques. He trained Karl J. Faltermeier my father, after his training he found a permanent position at the Antiquemuseum Basel in 1961. In the early 1970s he started to train my mother Corinna Faltermeier-Doer. Around 1980 my father handed me a scalpel and entrusted me with cleaning a piece of a Roman bronze under his supervision. So conservation restoration became my hobby. However, after high school I needed a solid foundation and a diploma in the profession. I was given the opportunity to be trained in visual merchandising at the Feldpausch AG and the Kunstgewerbeschule Basel. Half of my time I spent in the fashion house decorating the store and shop windows the other half I was trained in art history, drawing and design. During my holidays I was always permitted to work with my parents at the Antikenmuseum Basel. After completing my diploma in visual merchandising I had the chance to start a 2-year internship at the Antikenmuseum Basel. After this period of hands-on training it became clear that I needed a more solid education in the field so I enrolled at the Istituto Per L'Arte e il Restauro in Florence in 1988 to learn the restoration of ceramics and stone. Due to my previous experience I was able to finish the 2 year course in one year and was handed the diploma. Since the Swiss government funded my education I requested if I could transfer to the university of London Institute of Archeology to complete a certificate in archaeological conservation in 1989. After the certificate course the department suggested that I complete the Bachelor of Science in Archaeological Conservation in the following two years. My final thesis covered corrosion inhibitors for copper and copper alloys in archeology. My supervisor in the subject was Dr John Merkel. In 1992 after receiving my Bachelor's degree, Dr Merkel encouraged me to enrol into the MPhil/PhD program in Archaeological Conservation. It was easy to find a subject since my undergraduate thesis only scratched the surface of the vast problem of copper corrosion on archaeological artefacts Studies in Florence and my undergraduate degree in London were fully financed by the taxpayers of Basel Switzerland. However, the museum directors of the major museums in Basel decided that a PhD in archaeological conservation was not necessary to find employment in a museum. With a support of various institutional and private backers such as Christoph Merian Stiftung, the late Dr. Beyeler (Fondation Beyeler) and Ciba Geigy, I was able to raise the funds for the 3-year PhD. I am very grateful for the support from the Swiss government and the private individuals and institutions who gave me the chance to pursue my passion for the preservation of cultural heritage.

After completing my PhD I was offered a grant to publish excerpts of my PhD thesis and do further research in the postdoctoral program at the Institute of Archaeology at the University of London. At this point I have to mention that over the course of about 10 years I have applied three times for teaching positions at the Institute of Archaeology, however, other candidates were more suited. This resulted in me pursuing other avenues of conservation work in the private sector.

In 1999 Dr Jeremy Eisenberg, Director of Royal Athena Galleries in New York, gave me a one year position in his gallery to conserve and restore Roman and Greek artefacts. One of the most challenging projects was an Egyptian sarcophagus that was cut into four pieces in the past (Page 188). With the previously acquired skills I was able to reunite the four pieces and restore the missing parts of the base and the decoration. The year in New York working on this vast array of antique works of art was a challenge and hugely beneficial to me. It gave me the opportunity to gain a lot of experience in how to work independently. I was sorry to read that at the end of 2020 the gallery went out of business, working with Jerrie's team was very enjoyable.

In 2001 I was hired by the Heritage Conservation Centre (HCC), part of the National Heritage Board (NHB) in Singapore, as Senior Conservator of Objects. My main responsibility was to prepare the collection of southeast Asian antiques, principally ceramics, stone and metals for the Asian Civilization Museum (ACM) in Singapore. I have never previously experienced working on such a large number of artefacts, conservators, curators and other staff. Administrative work and internal workings were very draining on my physical and mental health. Working in a small laboratory setup is less demanding and easier to navigate. A few months after the museum was installed and reopened I was told that due to financial restraints my 3 - year contract was cut short by 4 months.

In 2003 after HCC/NHB and my affinity for southeast Asian art and culture I decided to stay in Singapore and open up my own studio. The environment is ideal since Singapore is safe clean and the legal framework allows me to function independently.

From 2003 to 2008 the workload slowly increased and suddenly after 2008 there was a distinct reduction of projects, due to a combination of economic recession and when new low-cost players showed up in the restoration of art sector.

Inexpensive and corner-cutting treatments are rarely identified immediately after returning the artefact to the client. Therefore only time and the exposure to an urban coastal tropical environment will show the shortcomings of such inadequate measures. Over the past 20 years in Singapore I have come across multiple times poor executed restoration treatments often resulting in more damage to the artefact. It was also apparent that 75% of Chinese antiques are either partial or total fakes. Very often ancient terracottas and other such items come with thermoluminescence certificates from recognized laboratories that ensure the buyer that the piece is ancient. In my experience many pieces are carved out of old original terracotta and made into sculptures like Tang horses, camels or ladies. The same goes for replicated bronzes where bits and pieces are mended together and covered in a fake patina. The present catalog shows many of these deceptions and often the buyer cannot return the fraudulent pieces.